December, 1947

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

Pre-Convention Number

HOW A GRAIN OF SALT WORKS TWO WAYS

Photo courtesy of Van Patten Pharmaceutical Co., Chicago

ACCORDING to reliable reports, man is now doing better than nature in making Vitamin C. The natural substance, and man's first synthetic duplicate of it have been found likely to upset the body's normal slight alkalinity and irritate the delicate membranes of the gastro-intestinal tract. But Vitamin C is so essential to vigor, longevity and healthy bone formation that biochemists have labored long to get rid of these ill effects. Years of experimentation culminating in the use of metallic sodium finally did the trick.

The new product, sodium ascorbate, not only is more potent in its effects on the body, but is chemically neutral, does not cause acidity, may safely be given in doses up to 2000 milligrams daily.

The fact that the nature of things can be changed by the use of the proper modifying influence is an old story to alert educators, who by the salt of common sense seek to temper the acids of human nature. They seek to channel human energy into activities beneficial to the whole. They seek to arouse ambition for higher goals, to give students a keener discrimination among the welter of values presented so indiscriminately by life.

The influences that determine which way students go are many and subtle. The educator is always on guard and alert to sift out the harmful and capitalize on the good. No wise teacher of mechanical drafting for example will miss the significance of the drawing instruments his students use. Employed regularly, the drawing set becomes part of the student's personal self, a personal possession. What quality shall this personal possession have, what care in its manufacture and its selection shall it exhibit? Shall the student feel ashamed of the set he has, or shall he feel proud? Shall it in its quality suggest shoddy work in class, or shall it suggest work lovingly executed? Shall it hint at the type of man and achievement drafting can lead up to? Or shall it in its cheapness repel the student's interest? No wise instructor *can* miss the significance here.

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EVERYTHING FOR
DRAFTING AND SURVEYING

South Bend 16" Lathes in The Technological Institute of Northwestern University

Their Future Is Yours

Tomorrow's top men of industry are in your classes today. The training they are receiving will gauge their future success. It is important that they acquire a thorough knowledge of basic industrial processes and methods. This is necessary in order to keep pace with the rapid progress of technological sciences. Consequently, practical shop courses command an important role in their education. Let their success reflect the thoroughness of your teaching.

See South Bend Lathes at
Booth No. 1
American Vocational Association Convention
December 16 to 18, 1947
Hotel Biltmore, Los Angeles, Calif.

SOUTH BEND LATHE WORKS

BUILDING BETTER LATHES SINCE 1906 • 466 EAST MADISON STREET, SOUTH BEND 22, INDIANA

ATKINS
Silver Steel SAWS

AS BASIC AS BOOKS

Good tools like Atkins "Silver Steel" Saws are as important to your school work-shop as good textbooks to other classrooms. They speed successful teaching because they make learning easier—by quickly overcoming the beginner's hesitancy—by helping him achieve early results that promote interest in doing better. They accomplish these results because they are the result of years of saw specialization . . . of producing blades that cut faster, cleaner, easier . . . of developing keener, tougher teeth that keep cutting longer. And Atkins Blades are budget-sparing, too — built to stand the knocks of day-in and day-out school-shop service.

E. C. ATKINS AND COMPANY
Home Offices and Factory: 402 S. Illinois St., Indianapolis 9, Ind.
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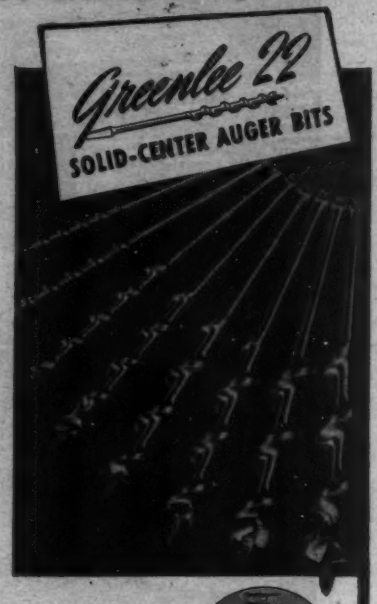
THE NAME FOR SOLID-CENTER AUGER BITS OF HIGHEST QUALITY

GREENLEE 22 is a name it will pay you to remember whenever you buy Auger Bits. For it assures you sharp cutting edges, accurate sizing, bright, high finish, and that smooth, easy action so necessary in fine craftsmanship. You can be certain, too, that every GREENLEE 22 Solid-Center Auger Bit is "factory sharp" when it reaches you. For each is "Plastic-Sealed" with a special protective coating to keep it in perfect condition for the exacting work you will surely want to do with it. To buy top quality, buy GREENLEE.



GREENLEE

SPECIAL OFFER . . . ONLY 10¢ FOR HANDY WOODWORKING CALCULATOR
Quick solutions to countless woodworking problems. Converts linear to board feet, gives slope per foot, nail and bit sizes, etc. 6" diameter. Send coin to Greenlee Tool Co., 2032 Twelfth Street, Rockford, Illinois.

The Pressure IS ON

WITH HARGRAVE CLAMPS

The high quality of Hargrave Tested Tools enable you to meet the most exacting workshop requirements. Each tool is Individually Tested to insure complete satisfaction. When buying clamps . . . from ¾" opening to 10 feet and from ½" to 16" deep . . . specify Hargrave.

WRITE FOR CATALOG *showing the complete line of clamps, cold chisels, star drills, brace wrenches, file cleaners, washer cutters, etc.*

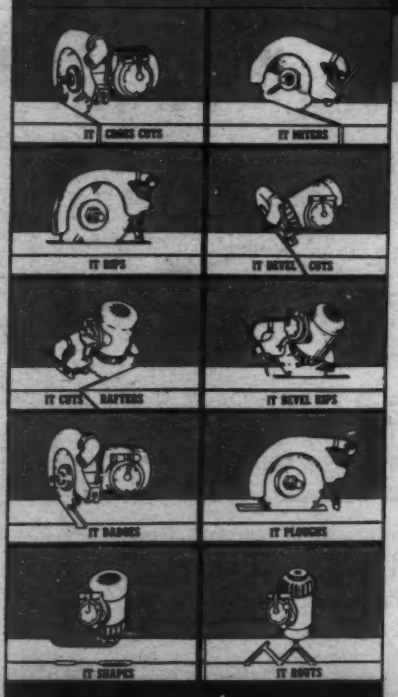
The CINCINNATI TOOL Co.

WAVERLY AND MAIN AVES. • CINCINNATI 12, OHIO

INDUSTRIAL ARTS AND VOCARTIONAL EDUCATION, December, 1947 Volume 36, No. 10. Published monthly, except July and August, by The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. Entered as Second-Class Matter January 2, 1914, at the Post Office at Milwaukee 1, Wis., under the act of March 3, 1879. Subscription price in the U. S., Canada, and countries of the Pan-American Union, $3.00 per year; Foreign, $3.50; Single copies, 35 cents.

He's really trained for the future when he's had a required course in the operation of a DE WALT

DE WALT is a complete shop in itself



...and with proper tools makes any cut possible!

After the student has completed his basic training course in the use of hand tools, he should have a required course in the operation of DeWalt.

Knowing how to make the fullest use of this flexible, easy-to-operate machine, will give any student a head-start as he prepares for tomorrow's industry.

When he leaves school he will be fully acquainted with a machine that is destined to occupy a prominent place in tomorrow's industry. The perfection of the DeWalt saw has created new methods in cutting wood, making obsolete old-style equipment previously used.

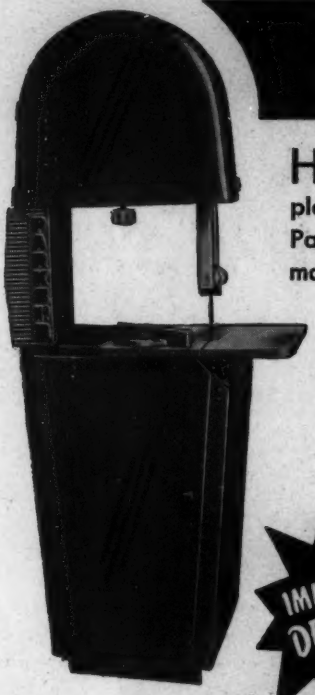
Ask a nearby DeWalt dealer about two DeWalt 16MM movies—one showing the general application of DeWalt—the other showing modern, pre-cutting techniques developed during the war. Write for catalog.

DE WALT, INC.

1212 Fountain Avenue **Lancaster, Penna.**

SAFE...ACCURATE...ECONOMICAL

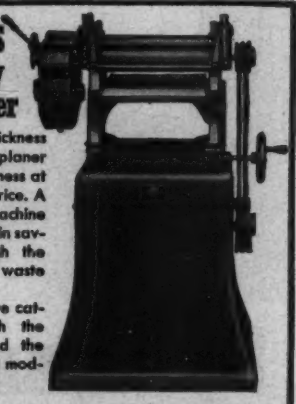
The PARKS No. 2–18" BAND SAW



HERE is a modern, completely guarded, heavy duty band saw that has a place in every school shop. Designed for accuracy and high production, the Parks No. 2, 18" Band Saw is a sturdy, low-priced machine that provides a maximum of performance, efficiency and economy of operation. Among its outstanding features are: Hard - Chrome - Plated Roller Guides; Light-Weight Aluminum Wheels; Heavy-Weight, Heavy Duty Frame; Safety; 3500 ft.-per-minute cutting speed; and Heavy-Duty Ball Bearings. For complete specifications and details write for descriptive catalog sheet.

IMMEDIATE DELIVERY

The PARKS Heavy-Duty 12"x4" Planer



A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. A real heavy-duty machine that will pay for itself in savings effected through the salvage of otherwise waste stock.

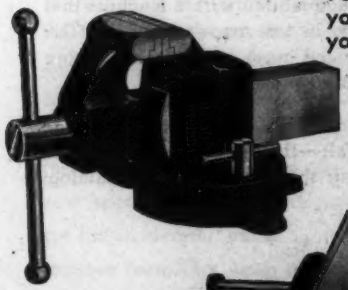
Write for descriptive catalog sheet on both the Parks 12" Planer and the sensationally new and modern Parks 20" Planer.

The PARKS WOODWORKING MACHINE CO., Dept. 22-B 1546 Knowlton St., Cincinnati 23, Ohio

Manufacturers of Quality Woodworking Machines Since 1887

MORGAN VISES

An **UNBEATABLE COMBINATION**



Perform a service to your school and give your students a real vise to work with. Specify MORGAN when you equip your shop, and get the best at no extra cost.

Morgan vises can be had in various sizes and styles to meet every purpose. Write for literature and prices.

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LUFKIN MICROMETER No. 1911

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SAGINAW, MICHIGAN,
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Announcing the New... 10 inch Atlas TILT/ARBOR SAW

Precision Built for Precision Workmanship

NEW—from its large, precision-ground table to its extra-heavy base . . . built to exacting industrial standards for school and commercial shops . . . designed for easier, more accurate cuts on all types of stock . . . that's the new Atlas 10" Tilt/Arbor floor saw!

Even your beginning students can quickly master all operations on this new, modern saw. All controls are easy to operate; permit speedy adjustments for every requirement. Table and mitre gauge have graduated scales for precise workmanship. Tilting/arbor and all working parts are engineered and constructed for permanent alignment.

An outstanding feature of this advanced saw is its unique rip fence — a rugged, well-braced casting extending the full length of the table. Fence releases instantly for removal of positioning on either side of blade. It is self-aligning. Locks securely at both ends for absolute rigidity. Rear fence railing has two ball bearings that assure fast, smooth positioning.

Still other advantages offered in the new Atlas Tilt/Arbor are listed below. To these, add unusual compactness — ruggedness that maintains accuracy through long use — and you can readily see why Atlas is the saw to specify. Send for details about this new Atlas precision tool today.

ATLAS PRESS COMPANY

1271 North Pitcher Street
KALAMAZOO 13, MICHIGAN

YOU GET ALL THIS WITH THE NEW ATLAS

- Sealed, precision ball bearings for permanent smooth operation.
- Easy accessibility for all maintenance.
- Maximum blade rigidity at all times.
- Massive construction — 262 pounds, less motor.
- Large table — 27½" x 27½" — with 13¼" working surface ahead of blade.
- Extension rods to simplify duplicate work.
- Blades tilt 0 to 45°. Angle and height conveniently controlled and locked.
- Mitre gauge graduated 60° left and right; indexed every 15°.
- Cutting depth: 3¼".
- Base dimensions: 19½" x 21½".
- Overall depth, with motor: 41½".
- Overall width: 32" — height: 39".
- Safety guard with anti-kickback pawls.
- Combination rip-crosscut saw blade.
- 10" diameter with ⅝" bore.
- Dual V-belt drive — uses standard 3450 RPM motor.
- Adjustable motor mounting base.

TRAIN WITH
Snap-on Tools
Using modern Snap-on tools to train productive craftsmen of the future means an early development of superior workmanship, speed, and dexterity. These are attributes that reflect credit to you in the growth of students to capable mechanics.
Snap-on, located in principal cities from coast to coast, offers the services and counsel of tool experts to vocational teachers. Write for the address of the nearest Snap-on branch and catalog of 4,000 Snap-on tools.
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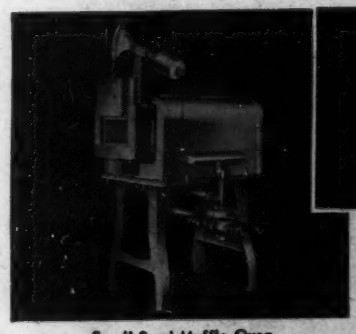
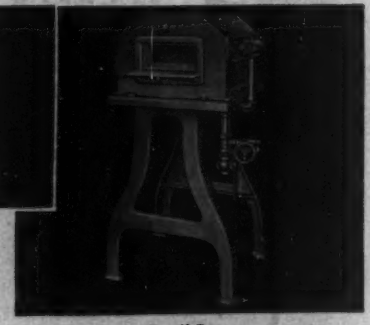
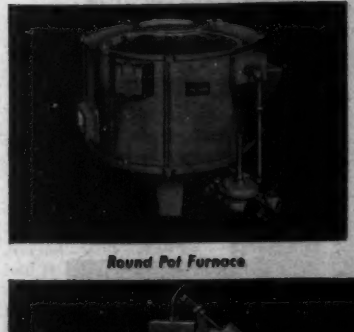
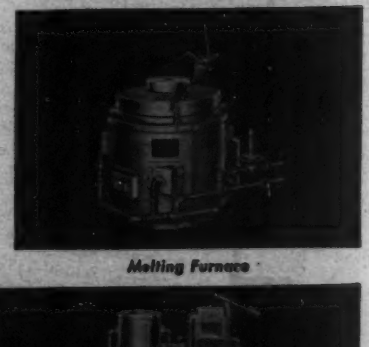
Sunbeam
STEWART
THE BEST INDUSTRIAL FURNACES MADE

HUNDREDS OF THESE SUNBEAM STEWART FURNACES ARE IN THE VOCATIONAL DEPARTMENTS OF TECHNICAL SCHOOLS


Small Semi-Muffle Oven


Small Forge


Round Pot Furnace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Because Sunbeam Stewart units have been designed for efficient production heat treating in small shops and tool rooms, they are widely recognized as standard equipment for all types of industrial heat treating and vocational training work. For student instruction and reference with further details on Sunbeam Stewart Furnaces especially suitable for school shop use, write for our free "STEWART HANDBOOK of Heat Treating Information and Equipment." Also the new Sunbeam Stewart DATA FILE on school units.

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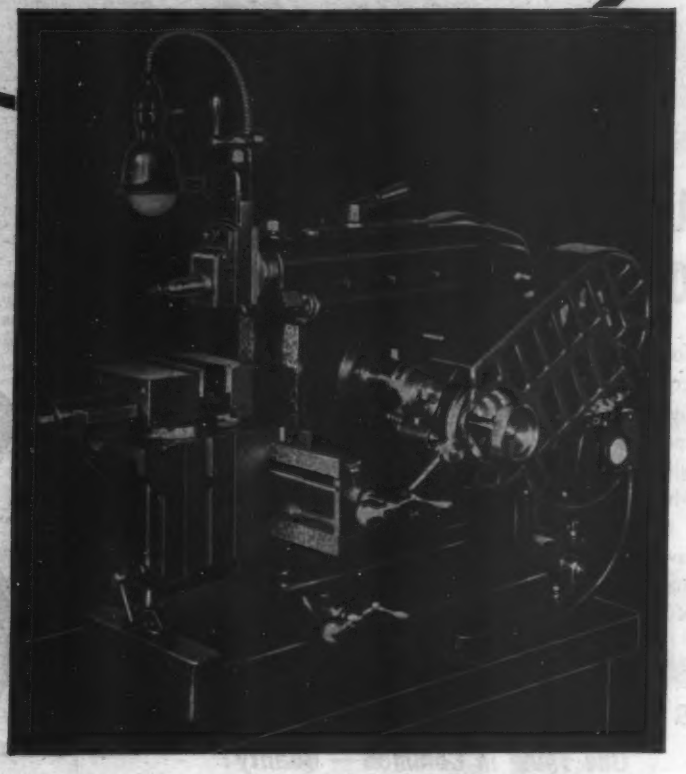
Bench Oven Furnace — Triple Purpose Combination "E" — Triple Purpose Combination "D" — Dual Combination

School shops now turn out Amazing Precision Work with AMMCO 7" SHAPER



Easy to use— Safe too

Now we make so many more things

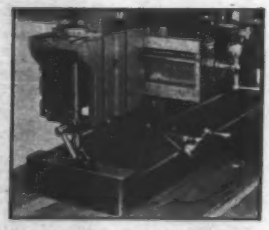
Shop's more fun now with Ammco Shaper

LOW PRICE Fits Every School Budget

Low in price, compact and space-saving in design, there is no big, expensive shaper that can beat AMMCO 7" SHAPER for accuracy and precision.

It handles a wide variety of work . . . is simple to operate. Boys take special pride in the craftsmanship it turns out . . . develop a new and lasting interest in self expression through good workmanship.

With special safety features, this is the ideal Shaper for school shop use. And at its new low price, it comes within the limits of your school budget. In bench or portable models . . . ready for immediate delivery! Write for specifications and low prices. Address Dept. IA-57.



Has "VEE" Type Ways, comparable to those of large, expensive shapers.

Portable Model is mounted on maple cabinet.

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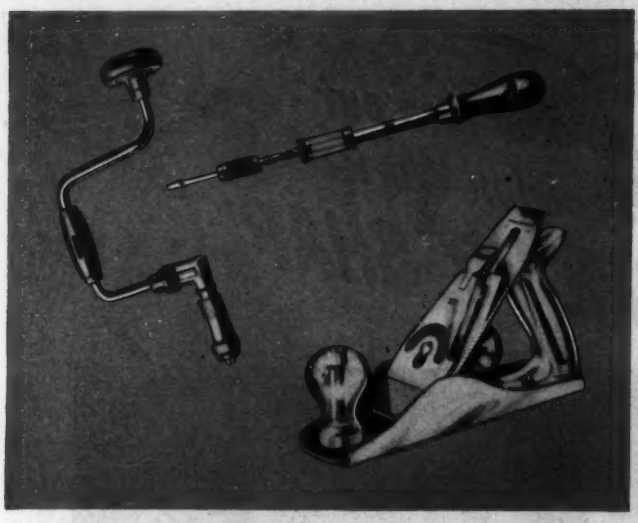
THE SKILL IS BUILT INTO AMMCO MACHINES



A HIGH QUALITY TOOL FOR EVERY TEACHING NEED

You will find that there is a Millers Falls tool to meet most requirements in manual training shops—a tool of the finest design and workmanship, a tool that can be relied upon for the utmost in accuracy, performance and durability. Your students will gain confidence and learn faster when they have such top-quality tools to work with.

Millers Falls hand and electric tools have been the favorite of skilled workers, teachers and students alike for many years. Ask your supplier to show you the complete Millers Falls line.

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NEW TOOLS
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Amazing Ratchetor
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Many More at Your Plomb Dealers
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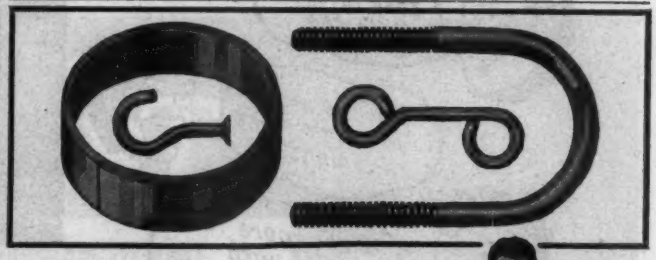
PLOMB Streamlined TOOLS



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DI-ACRO Bender No. 2 forming steel tubing

Thousands of DI-ACRO Benders are in regular production use forming a great variety of small parts of manufactured products. Your students can learn to duplicate parts accurate to .001" in tubing, angle, channel, flat, round, or square materials with these precision machines.

Send for Catalog "Die-Less Duplicating" which fully describes and illustrates all models of Di-ACRO Benders, Brakes, Shears, Punches, Rod Parters, Notchers.

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DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING
O'NEIL-IRWIN MFG. CO.
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FOR CUTTING *VARIED* MATERIALS
WITH *UNVARIED* ACCURACY . . .

Walker-Turner 14" and 16" band saws

14" Woodworking Band Saw, BN905. Price: Less base, motor, gear assembly and belt guard, $129.50. For conversion to metalworking, speed reduction gear assembly and slo-speed motor available.

For cutting a full scope of materials – wood or plastics to tool steel – Walker-Turner's 14" and 16" Band Saws have every required blade surface speed . . . from 175 to 4630 F.P.M. on 14" model, 200 to 5300 F.P.M. on 16", with standard motors. Slo-speed motor ranges from 61 F.P.M. Large table area makes for safe handling and feeding of big work pieces. Keeps work in full view at all times.

Ball-bearing adjustable blade guides prevent blade deflection . . . make possible close tolerance cutting and trimming – often eliminate extra machining.

Simple to set, convenient to control, the Walker-Turner Band Saw cuts work-spoilage to a minimum . . . economizes on power . . . pays its way the first few weeks in operation.

RIGHT COMBINATION – Safe, accurate, long-lived . . . readily serviced . . . these Walker-Turner Machine Tools make up a balanced team of top performers in any shop.

COMPLETE CATALOG OF WALKER-TURNER MACHINE TOOLS SENT ON REQUEST.

15" Drill Press, Bench Model D-950. 6 spline spindle, 4 ball bearings, 4¼" spindle travel; speeds with 1740 r.p.m. motor, 600 to 5000 r.p.m.
Price: Less motor and belt guard, $69.50

10" Tilting Arbor Saw, TA1180B. Self-indexing miter gauge regular equipment. Full protection safety devices.
Price: Less motor, switch, extension tables, guard and splitter.....$150.00

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MACHINE TOOLS

DRILL PRESSES – HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
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4 BITS THAT GO A LONG WAY

STRAIGHT BITS.. the most popular of all Router Bits used for inlaying, making moulding cuts, tongue and grooves, panel work, rabbeting cuts, etc.

ROUNDING OVER BITS . . . are used for rounding over edges and are guided by a pilot like the Beading Bit.

BEADING BITS . . . used for making moulding beads on edges of tables, stools and other pieces of furniture. These bits have a pilot so they can be used on inside and outside work as well as on curved edges.

DOVETAIL BIT . . . used for cutting dovetails in drawer fronts, boxes, etc. Very effective when used in connection with the Carter C-61 Dovetail Attachment.

. . . to put skill in your students' hands

Here's how to expand your shop facilities on a limited budget — how to teach your students to turn out professional work in double-quick time with tools that are standard throughout industry.

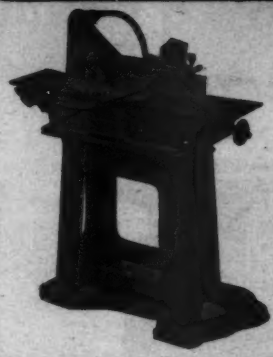
Carter Router Bits are made of the finest Tungsten High Speed Steel. Each bit is machined within close limits and honed by hand to insure clean cutting at high speeds — for *longer* periods. Write for descriptive folder. Stanley Electric Tools, Stanley-Carter Sales Dept., 536 Myrtle Street, New Britain, Conn.

STANLEY

Reg. U. S. Pat. Off.

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

WALLACE "MACHINE-OF-THE-MONTH"



No. 10 JOINTER

Direct drive at 3600 or gear drive at 5200 r.p.m.! 8" *four*-knived cutter-head with knives set askew for *shearing* cut! Taper roller bearings. Semi-steel tables. Capacity to cut ¾" deep.

What a Jointer! This quality-built Wallace No. 10 Model has power — speed — capacity and accuracy in a measure never known before!

Skew-set knives take a shearing cut — does *perfect* edging work, rabbetting, bevelling. Smooth, clean surfacing cuts seldom require sanding.

Write today for bulletins, — we also manufacture high-grade Universal Saws, Radial-arm Saws, Bandsaws, Shapers, Lathes, Mortisers, Oilstone Grinders, etc.

Exhibiting in Booth No. 40 — A.V.A.

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CUT UP TO 18 GAUGE MILD STEEL WITH A FOOT-POWERED

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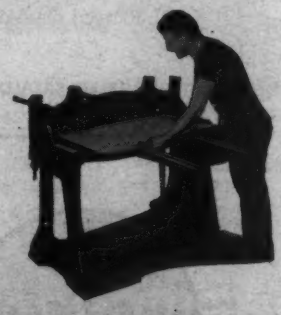
SQUARING SHEAR

A POWERFUL MACHINE THAT NEEDS NO POWER

• Quick, accurate shearing of mild steel is possible with a Famco Squaring Shear. Five sturdy models, built of semi-steel, accurately machined, can be located anywhere in the shop . . . require no wiring, motors or line shafts. Cutting widths range from 22" to 52"; each model has easy-to-set gauges. Write today for full details.



FAMCO MACHINE CO. • 1317 18TH ST. • RACINE, WIS.

famco (COST CUTTING) machines

ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS

COLUMBIAN VISES

INDUSTRY'S FIRST CHOICE FOR OVER THIRTY YEARS

Columbian Continuous screw Woodworker's vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES, as above, to eliminate handle breakage, speed operation and provide extra leverage.

The complete line of Columbian Vises is designed to excel in its field—all are made to the same high standard of engineering and workmanship. A vise for every need and purpose.

Columbian Machinist's Vises are made of malleable iron castings, guaranteed unbreakable, and designed to provide accurate, dependable equipment for school and industrial shops. All standard types.

THE COLUMBIAN VISE & MFG. CO.
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THE WORLD'S LARGEST MAKERS OF VISES

ARMSTRONG

"C" CLAMPS
ARE ALL DROP FORGED

For "C" Clamps that never spread, that never spring or loosen . . . for unequalled stiffness, strength and holding power . . . for years of dependable service, for the finest clamps made, specify ARMSTRONG "C" Clamps.

ARMSTRONG "C" Clamps in design, steels, heat treating, and accuracy of machining are high quality tools. Screws are of special analysis steel with close fitting thread, hardened points of free-action swivel. They are handier and absolutely dependable. Standardize on ARMSTRONG Drop Forged "C" Clamps.

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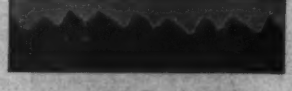

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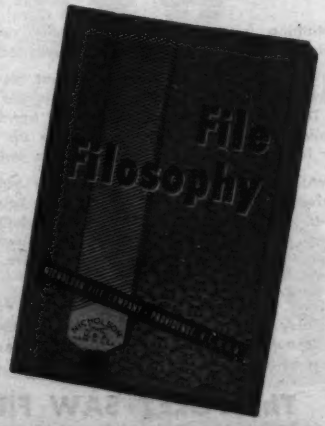

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VOL. 36, NO. 10 DECEMBER, 1947

Industrial Arts and Vocational Education

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► Welcome to California

Los Angeles, long noted for its oranges and its motion pictures, has another distinction of which it is justly proud. It is to play host to the A.V.A. Convention, December 15–18. This promises to be the most successful convention in A.V.A. history. There are several reasons to support this statement:

1. Adequate preparation — local and state convention committees have been working since last December and have made most extensive plans for all phases of the convention activities.
2. Program — outstanding general and section meeting programs have been arranged.
3. School visitation — the Los Angeles city and county schools will be in session and open for visitation. Transportation to and from schools will be furnished.
4. Location — Southern California in December is ideal for convention meetings and sightseeing.
5. Hospitality — characteristic California hospitality and friendliness will prevail.

Delegates will have an opportunity for sightseeing along with their professional duties. Hollywood, with its motion picture industry; Santa Monica, a few miles to the west on the Pacific Ocean; beautiful Pasadena on the east, home of the Huntington Library and California Institute of Technology; Glendale and San Fernando Valley on the north; and Long Beach, on the south with its seaport, are all places of interest. A trip to beautiful Santa Barbara on Friday, December 19, has been arranged for delegates interested in industrial-arts teacher training. Santa Barbara College, with the finest industrial-arts plant in the nation, will play host. A drive north on the scenic coast highway will be a fitting climax to the convention journey.

Old-timers who attended the 1927 A.V.A. Convention in Los Angeles will see great changes here. In the past decade Southern California has become one of the nation's leading industrial and commercial centers. Motion pictures, oil aircraft, steel, automobile assembly, citrus, food processing, ceramics, and clothing are only a few of the great industries located in this area. Southern California has also become a great distributing center for manufactured goods and foodstuffs. It serves the Southwest United States and the far reaches of the Pacific Area. Los Angeles Harbor, in volume of shipping, is one of the great seaports of the world. — *C. E. Nihart.*

► This Month's Cover

"In the Machine Shop" is a good title for this month's cover picture. It was submitted by H. W. Humphrey, assistant professor of industrial arts, Ohio University, Athens, Ohio.

► Things to Remember

- Buy Christmas Seals
- Join the March of Dimes, January 15–30
- Mail us a card if you wish to get an index for Volume 36 of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine. Indexes will be available shortly.

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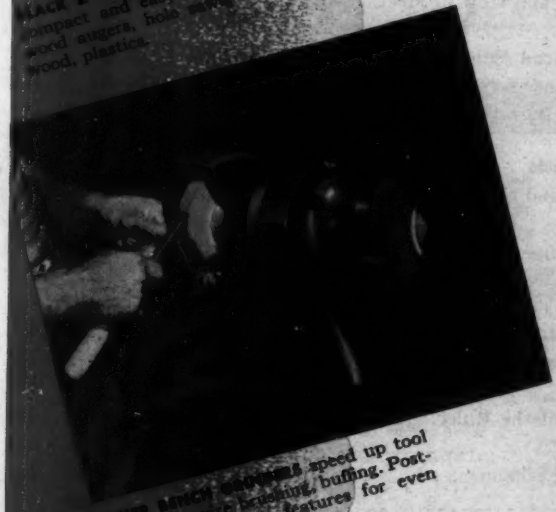

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This School Furniture Factory (*below*) constructs and repairs equipment for the entire school system of Des Moines, while training high school students, veterans and other adults. Many Black & Decker Tools, like those on this page, are used here, as well as in the machine shop, the auto mechanics shop and the aviation building.

-IAVE-

DECEMBER . . 1947

Industrial Arts and Vocational Education in the Convention City

C. E. NIHART
Head Supervisor
Vocational and Practical Arts
Los Angeles, Calif.

The Los Angeles city school district is now the third largest in the United States. The vocational and industrial-arts programs extend through the elementary schools, junior high schools, senior high schools, trade school, junior colleges, and adult schools. Los Angeles city schools have always given emphasis to practical education. Secondary schools and trade schools offer an exceptionally wide variety of vocational and industrial-arts courses. A large force of teachers is employed: approximately 150 full-time industrial-arts teachers in the junior high schools, 230 in the senior high schools, 115 teachers in vocational unit-day trade classes in senior high schools, trade school, and junior colleges. In addition to the day school staff there are hundreds of other teachers of industrial arts, trade extension, and apprenticeship classes in adult evening schools. Industrial arts in the elementary schools is taught by classroom teachers.

Vocational Trade and Industrial Education

The program of trade and industrial education in the Los Angeles city schools has been developed to meet the needs of one of the most highly industrialized areas in the United States. The phenomenal increase in population, and the rapid manufacturing and industrial expansion during the past ten years, has created an enormous demand for training in trade and industrial occupations. Fully one third of the total population of California lives in Los Angeles County.

The Los Angeles city schools maintain programs of trade and industrial and technical education at the Frank Wiggins Trade School, Los Angeles City College, East Los Angeles Junior College, 15 adult evening high schools, and 16 day senior high schools.

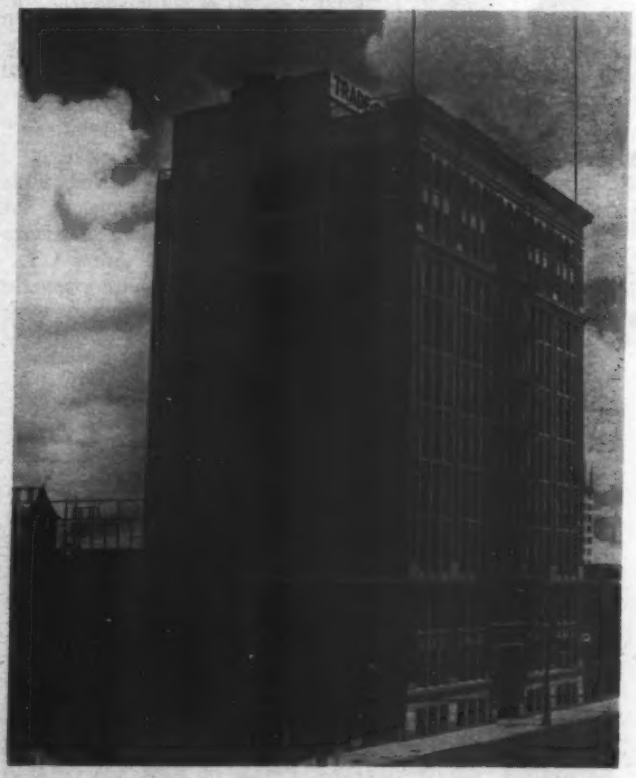
Frank Wiggins Trade School

Approximately 3000 day trade preparatory and day trade extension students are enrolled in the Frank Wiggins Trade School. In the evenings over 3500 employed workers, including 1500 indentured apprentices, attend trade extension classes.

The trade school offers instruction in over fifty trades, and has ten departments serving the following major industrial fields:

- Building construction and maintenance
- Electrical and radio industries
- Food trades
- Automotive repair and maintenance
- Machine shop and metal trades
- Aircraft construction and maintenance
- Clothing trades
- Printing and bindery trades
- Commercial art and photography
- Cosmetology and hairdressing

All trade preparatory and trade extension programs are maintained with the close co-operation of the industry served. Over fifty trade advisory committees representing management and labor meet periodically with the administrators of the trade school to discuss training needs and trends, and to advise regarding curriculum changes and new courses that should be offered.



Main building, Frank Wiggins Trade School. The school has five annexes scattered throughout the community

Servicing radio and radio equipment, trade school

Junior Colleges

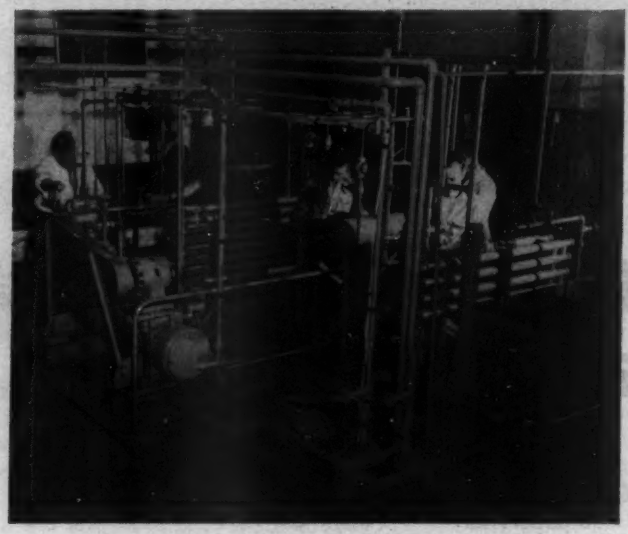
Los Angeles City College and East Los Angeles Junior College offer two-year terminal courses that prepare students for employment and advancement in the following semiprofessional occupations:

Dental assistant	Commercial artist
Architectural draftsman	Apparel designer
Photographer	Police officer
Radio broadcast technician	

In order to serve more adequately the rapidly growing industrial communities in the Los Angeles harbor area, plans have been approved for a new junior college and technical institute to be built near San Pedro. This institute will offer two-year terminal trade and technical courses in the following industrial fields:

Mechanical and engineering drafting
Machine shop, tool- and diemaking
Electricity and electronics
Gasoline and Diesel engine repairing and maintenance
Petroleum processing and instrumentation
Pipe fitting and welding
Printing and journalism

Production work, vocational mill cabinet class, senior high school



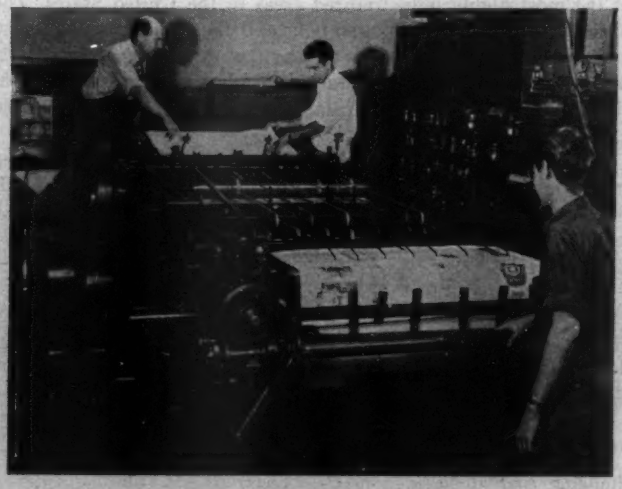
Refrigeration apprentices at work

Adult Evening Schools

The Los Angeles city schools maintain one of the largest programs of adult education in the nation. Last year, over 133,000 different persons attended evening school classes taught by approximately 800 teachers. This year, approximately 40 per cent of the evening school enrollment is in trade and industrial and business education courses. The Frank Wiggins Trade Evening School has 110 trade extension classes with an enrollment of approximately 3500. Trade extension classes also are maintained in 12 evening high schools.

Senior High Schools

Vocational trade training classes are maintained in 16 of the 36 senior high schools. These courses are organized under the provisions of the Federal Vocational Education Acts and provide two years of trade preparatory training in 18 different trades. Students enrolled in vocational courses receive 1200 hours of practical training in the school shop and 400 hours of related technical instruction in addition to meeting the requirements for a high school diploma. Vocational courses are offered in the following trades:



Printing press work, trade school

Architectural drafting	Furniture upholstering
Auto electrics	Machine shop
Auto mechanics	Mechanical drafting
Cabinetmaking and millwork	Patternmaking
Cooking and baking	Photography
Cosmetology	Power sewing
Dressmaking	Printing
Electricity	Sheet metal
Foundry	Welding

Graduates may continue their vocational training at the Frank Wiggins Trade School or enter employment in industry as advanced apprentices.

During the convention vocational classes in the Frank Wiggins Trade School, the City College, Manual Arts High School, and Fremont High School will be open for visitation.

George W. MacKenzie is the supervisor of trade and industrial education.

Apprentice Training

The Los Angeles city schools apprenticeship program during the school year 1946–47 increased from 96 to 133 classes per week, a gain of more than 25 per cent. There were 5429 enrolled in the following trades:

Bricklayer	Electrical wireman
Cabinetmaker	Furniture maker
Carpenter	Ironworker
Calker and repairman	Machinist
Dental technician	Optical technician
Die sinker	Painter
Electrical cable splicer	Planing millworker
Electrical conduitman	Plasterer
Electrical fixtureman	Plumber
Electrical lineman	Printer
Electrical repairman	Refrigeration fitter
Electrical serviceman	Sheet-metal worker
Electrical signman	Tile setter
Electrical tester	Tool- and diemaker

This program provided service for a total of thirty joint apprenticeship committees. This year, 1947–48, it is indicated that the increase in the program will be even greater than last year.

Last year, the bricklaying and painting programs, which had been inactive during the war, were re-established as evening school programs. This year, they are functioning as day school programs, as they did before the war. The apprentices attend school eight hours every two weeks and are paid their wages for the time spent in school.

Day school classes have been started for Union Pacific Railroad apprentices for the trades of electrician, carmen, machinist, and sheet-metal workers. The classes are held at the Union Pacific shops on company time. Later, the program will be expanded to include blacksmiths and boilermakers. This program started simultaneously with similar ones in the shops of the Union Pacific in Colorado, Oregon, Utah, Nebraska, and Idaho. A new program has been started for the foundry industry. The coremakers and molders attend day school classes on company time, and the patternmakers attend evening classes.

New evening apprentice classes have been established this year for cement finishers, locksmiths, meat cutters, pipe fitters, ornamental plasterers (Hollywood Studios), roofers, sign painters, and, as soon as teachers can be obtained, classes will be added for glaziers, lathers, and wood finishers. Also, committees have been formed and programs are under development for the trades of custom tailor (Hollywood Studios), and operating engineers.

A staff of eight full-time co-ordinators are employed for the following trades:

General metal, junior high school

Electrical	Printing
Food	Sheet metal
Metal	Refrigeration
Plumbing	Woodworking

William H. Cole is the supervisor of apprenticeship education.

Senior High School Industrial Arts

Industrial arts at the senior high school level emerges as a continuation of the exploratory phase of junior high school shopwork, contributing to the enrichment of all school subjects, especially in the tenth grade. The student having chosen the industrial-arts curriculum may concentrate on one or two shop subjects in the eleventh and twelfth grades.

Industrial-arts courses in all shop subjects are organized on three levels:

1. Basic Courses — These courses include training in basic skills, processes and related technical knowledge, and are planned for students who have had less than two semesters of previous experience in junior high school.

2. Courses SI and SII (S indicates Senior High) — Designed primarily for students majoring in industrial arts who have had the prerequisite of two semesters of shopwork in the subjects selected.

Woodwork, junior high school

Children working in elementary school classroom, and industrial arts outdoors

3. Courses SIII and SIV — Designed for advanced students. The work becomes more difficult and intensive.

The senior high schools offer work in a variety of subjects depending upon the community situation and the needs of the students. The majority of schools offer auto mechanics, drafting — both mechanical and architectural, electricity and radio, general metal, machine shop, printing, and woodwork. Additional offerings are photography, aviation, welding, reedwork, general crafts, specialized drawing — such as patent office, pipe-line and oil-field installation, topographical and production illustration. Experiments have been made with ceramics of the tile, cement and plaster casting, and service occupations, such as pressing and cleaning, building maintenance, and auto service. Home mechanics is an integral part of all shopwork.

The instruction and organization of all senior high school industrial arts is based on accepted educational values and outcomes and the development of desirable traits and habits that will aid the student in making a satisfactory adjustment in modern society.

Virgil Volla supervises the industrial-arts program in 36 senior high schools and 3 special high schools for boys.

Dorsey, Marshall, and Jackson high schools will be open for visitation during the convention.

Junior High School Industrial Arts

The junior high school industrial-arts program of the Los Angeles city schools offers a rich exploratory experience to all seventh-, eighth-, and ninth-grade boys in a variety of basic industrial-arts activities. This program consists of six exploratory courses — handicraft, mechanical drafting, general electricity, woodwork, general metal, and graphic arts — each course of ten weeks' duration. Pupils may, after completing this cycle, elect for further tryout one or more of these activities in which they have shown interest and ability. Elective courses are offered in the A8, B9, and A9 grades.

Senior high school industrial-arts building

The junior high school industrial-arts offerings are not narrow unit shop activities, for each represents a broad industrial field. For example, general metal includes exploratory experiences in bench metal, welding and brazing, metal casting, art metal, sheet metal, forging, and elementary machine shop. Graphic arts has been broadened to include, in addition to printing, such activities as silk screen reproduction, book binding, embossing, linoleum block cutting, etc. One of the most unique offerings is being developed in handicrafts. This boy-interest course includes wood carving, pocketknife whittling, leatherwork, plastics, plaster-of-Paris casting, reedwork, metal tooling, decorative finishing, and outdoor craft.

The industrial-arts program is concerned with a variety of life problems, including the production, selection, and consumption of industrial products, occupational exploration and guidance, appreciation of good design and construction, maintenance of the home and its mechanical appliances, and the construction of articles for use in home and recreational activities. Every project made in the junior high school industrial-arts program is initiated by definite boy interest and appeal. In addition to the exploration of broad general occupational fields through manipulative experiences, the boys also gain information through study and investigation, illustrated talks, demonstrations, visits to industrial plants and motion pictures.

J. Lyman Goldsmith supervises the industrial-arts program in our 30 junior high schools.

Audubon, Bret Harte, and Gage Avenue Junior high schools will be open for visitation during the convention.

Industrial Arts in the Elementary Schools

The elementary schools industrial-arts program in Los Angeles begins in the kindergarten and continues in logical sequence through the sixth grade.

The program is conducted by the classroom teacher who integrates industrial arts with the regular curriculum. The various skills are not taught as isolated things, but are incorporated into classroom and individual pupil projects.

In the primary grades the activity consists of building projects pertaining to the regular classroom work, the building of trucks, boats, airplanes, trains, etc. Pupils are taught the use of tools including the crosscut saw, hammer, C clamp, cabinet file, backsaw, try square, brace and dowel bits, ruler and keyhole saw. Teachers are enthusiastic over the results of construction work carried on in the classroom.

The facilities of the classroom for this activity include hand

tools, sawhorses, and a rolling tool cart which can be used in a number of rooms.

In the upper grades this activity is continued, but in addition handicraft is introduced to meet individual needs and interests. The work undertaken is kept within the ability range of pupils and a reasonable degree of skill is expected.

The whole program is one of the gradual development of the child's skill and knowledge. In the kindergarten only three tools are used. In each of the succeeding grades new tools and skills are introduced until at the end of the sixth grade the child has learned to use 23 tools in 34 different manipulative operations.

Two full-time supervisors serve the elementary schools, assisting with classroom problems, demonstrations, and the direction of the teacher in-service training program. These industrial-arts supervisors with kits of tools and sample projects visit in the schools and give teacher and class demonstrations.

An industrial-arts workshop, centrally located, adequately equipped with tools and materials and under the direction of a trained supervisor, is open at all times to teachers who wish instruction in the use of tools. Workshops are scheduled in remote districts for teachers unable to travel to the central workshop.

Supervision of elementary schools industrial arts is under the direction of Wayne Wonacott and John A. Marbut.

The Palms, Thirty-Second Street schools, and the industrial-arts workshop will be open for visitation during the convention.

Aerial view of industrial education plant at Santa Barbara College, Santa Barbara, Calif. An all-day program for A.V.A. visitors has been arranged for Friday, December 19

A Special Invitation

J. Harold Williams, acting provost of the University of California, Santa Barbara College, is issuing an invitation to all persons attending the American Vocational Association Convention in Los Angeles to spend December 19, the day following the convention in Santa Barbara, for the purpose of visiting the industrial education program at Santa Barbara and other points of interest in that historic city.

The program is being planned to include an open house at the Department of Industrial Education, which occupies approximately 70,000 square feet of floor space in new structures finished just before the outbreak of the war and is equipped with some of the most modern facilities of any similar institution in the United States.

It is assumed that a great many visitors attending the annual convention will make their way northward after the Los Angeles convention, and Santa Barbara will be a logical stopping point, being located on both the coast highway and the southern Pacific coast line.

The program as planned will include visiting of classes in various types of craftwork and technical work during the late morning and early afternoon, a visit to the Santa Barbara Mission, and to the world-famous Santa Barbara courthouse and other points of special historic interest during the late afternoon. The day's activities will culminate in a dinner meeting in the evening with a professional program and a social hour. Opportunities for making reservations for the dinner program will be offered during the convention in Los Angeles. Hotel reservations should be made now with Emanuel E. Ericson, chairman, Department of Industrial Education, Santa Barbara College, Santa Barbara, Calif.

Student Characteristics and Progress

EDWARD K. HANKIN
Lecturer, University of Pennsylvania
Philadelphia, Pa.

(Continued from page 331 of the October, 1947, issue)

This study included all pupils admitted to the machine design and drafting curriculum during the nine terms from September, 1940, to September, 1944, inclusive. This made a total of 226 cases, distributed as shown in Chart I. This chart shows, for each admissions group (those pupils admitted during any one term), the number admitted that term, the number dropping out during succeeding terms, from that group, and the number of persons reaching the sixth term, which were counted as graduates. In most groups there is shown a number of persons dropping out before the beginning of the second term. This figure indicates those pupils who remained on roll less than one month after they were admitted. These pupils are referred to later in the study as having a tenure of zero as compared to those others who dropped out without reaching the second term who are listed as having a tenure of one.

Those pupils numbered to the right of groups 6, 7, 8, and 9 in Chart I were active in the school at the time of the study. As will be noted later, special consideration is given the data on these cases, especially as regards tenure, which for them is indeterminate except as a minimum. Also, for those cases dropping from school before September, 1942 (21 cases), for whom complete school records were not available, and for a scattered few cases

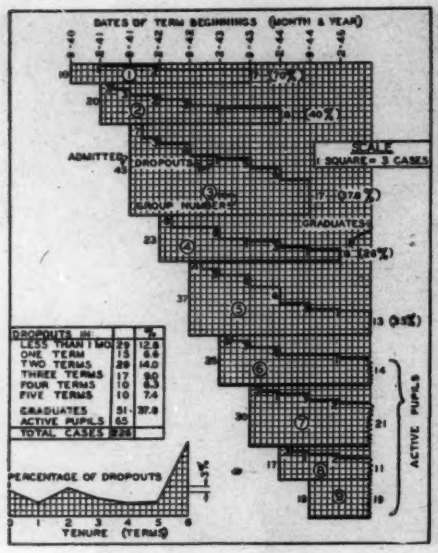


Chart I. Admissions and tenure of nine groups

for whom complete school records could not be found, certain parts of the study could not be made. For these pupils, only comparisons involving age and tenure were possible, for the missing records carried all other admissions data and grades earned at Dobbins.

Source of Data

Data for this study were taken from the following files of the Murrell Dobbins Vocational School:

1. First-term office roll sheets for the machine design and drafting curriculum first term sections for the terms beginning September, 1940; February, 1941; September, 1941; February, 1942; September, 1942; February, 1943; September, 1943; February, 1944; and September, 1944. These rolls list all of the pupils admitted to this curriculum during the period included.
2. Alphabetical index of active pupils.
3. Alphabetical index of graduated and dropped pupils. These indexes show the present status of all the pupils who have been admitted to the school, including the date when they were dropped or graduated, the number of terms work completed, present action of active pupils, and date of birth.
4. Individual history folders of active pupils (filed by record section).
5. Individual history folders of pupils dropped or graduated since September, 1942 (filed aphabetically).

These folders contain the individual admissions record card bearing all of the data which was available at the time pupil was admitted to the school, such as interview rating I.Q. mechanical aptitude test scores, and a summary of the sending school's grade record. Also in the folders is the record summary card bearing the accumulation of all grades and ratings earned by the pupil while enrolled at Dobbins.

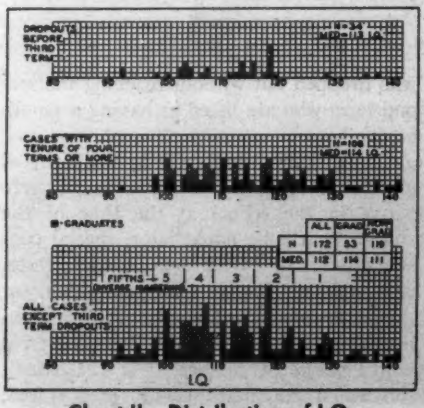


Chart II. Distribution of I.Q.

Procedure — Accumulation of Data

All data from the several sources indicated in the foregoing were recorded on individual data cards as shown in Figure I. These data were entered about the periphery of the card in the spaces indicated by lower case letters. These same letters are used below for reference in describing the data and their sources.

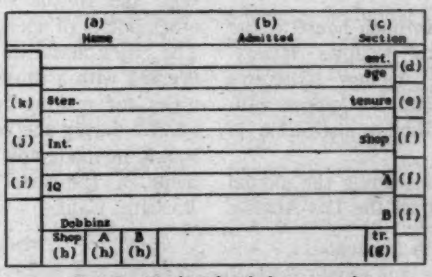


Fig. 1. Individual data card

Information on Individual Data Card

a) Name: Last name and first initial. Taken from source 1.

b) Admitted: Date in year and whole months taken from source 1.

c) Section: For active pupils, section number recorded from source 2.

For dropped pupils letter D and date dropped in year and whole months from source 3.

For graduates letter G and date of graduation in year and whole months from source 3.

d) Entrance Age: To left, date of birth in year and whole months from sources 2 and 3. To right, age to nearest half year computed from dates of birth and admission.

e) Tenure: Number of term reached before dropping. Source 2 and 3. G for graduates and O for those pupils who dropped within one month of admission.

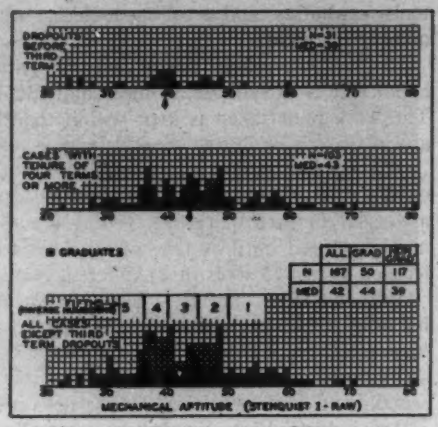

DROPOUTS BEFORE THIRD TERM
CASES WITH TENURE OF FOUR TERMS OR MORE
GRADUATES
ALL CASES EXCEPT THIRD TERM DROPOUTS
MECHANICAL APTITUDE (STENQUIST I - RAW)

Chart III. Distribution of Stenquist I raw scores

f) Previous School Grade Summary: Shop, subject group A (technical subjects such as science and mathematics). Subject group B (nontechnical subjects such as English, history, and social studies). Average grade of these subjects in sending school from admissions record card in source 4 and 5.

g) Trial Admission: X recorded for each pupil admitted on trial. From admissions record card in source 4 and 5.

h) Dobbins Grade Summary: Shop, subject group A, and subject group B. See item f above. Average grade of these subjects at Dobbins from record summary card in source 4 and 5.

i) I.Q.: I.Q. from admissions record card in source 4 and 5.

j) Interview Rating: From admissions record card in source 4 and 5 (1 to 5, 1 high).

k) Stenquist: Raw score from admissions record card in source 4 and 5.

Procedure — Compiling of Data

The compiling of data for this study was largely a matter of plotting the distributions and scattergrams presented in Charts I to XVII. Once the data were recorded on the data cards, it was rather a simple matter to arrange the cards in the desired order for the plotting of any single item. By shuffling and dealing the cards, the data were easily grouped and classified for plotting the comparison of two items. For instance, for the plotting of the several

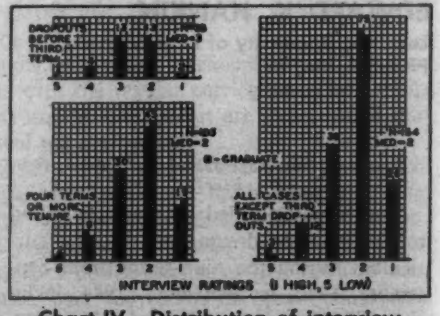

DROPOUTS BEFORE THIRD TERM
FOUR TERMS OR MORE TENURE
ALL CASES EXCEPT THIRD TERM DROPOUTS
GRADUATES
INTERVIEW RATINGS (1 HIGH, 5 LOW)

Chart IV. Distribution of interview ratings

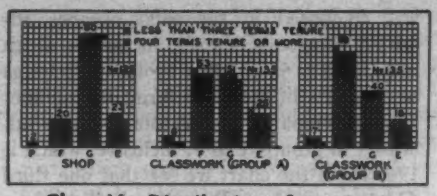


Chart V. Distribution of previous school grades

scattergrams included on Chart VI, the cards were first divided into five groups representing the five fifths of the I.Q. distribution. Each of these five groups were then subdivided into groups on the basis of the item which was to be plotted against the I.Q. For scattergram (A) on Chart VI, this meant subdividing each I.Q. fifth group on the basis of the shop grades at Dobbins. This made a total of twenty divisions for the entire pack of cards, one for each space on the scattergram, except that in this case there were no cards in the group representing 4–P, there being no cases where a pupil in the fourth fifth received a grade of P in shop. After this subdivision it but remained to count the number of cards in each division and record the count in the proper space of the scattergram.

Other aspects of compilation of data, such as the coding of distributions, will be discussed in the analysis of the individual charts. In general, the compiled data are grouped under chart numbers on the basis of the compilation of a single characteristic. For instance, Chart II shows the distributions on the basis of intelligence, while Chart VII includes all the comparisons having mechanical aptitude as the common characteristic, and Chart XIII shows the comparisons made based upon a calculated battery index.

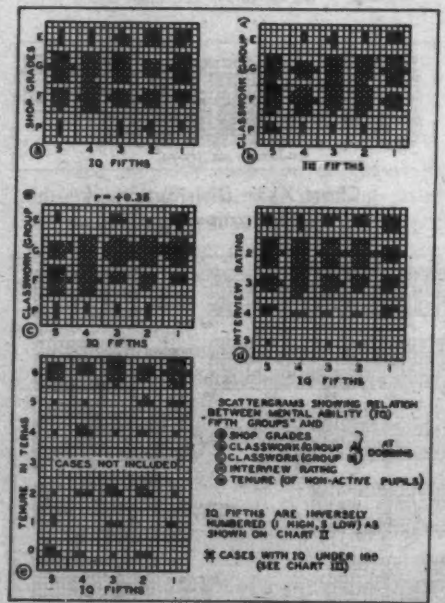

SHOP GRADES
IQ FIFTHS
CLASSWORK (GROUP A)
CLASSWORK (GROUP B)
INTERVIEW RATING
TENURE IN TERMS
CASES NOT INCLUDED
SCATTERGRAMS SHOWING RELATION BETWEEN MENTAL ABILITY (IQ) FIFTH GROUPS* AND
SHOP GRADES
CLASSWORK (GROUP A)
CLASSWORK (GROUP B)
INTERVIEW RATING
TENURE (OF NON-ACTIVE PUPILS)
AT DOBBINS
IQ FIFTHS ARE INVERSELY NUMBERED (1 HIGH, 5 LOW) AS SHOWN ON CHART II
* CASES WITH IQ UNDER 100 (SEE CHART III)

Chart VI. Scattergrams re mental ability

Results — Analysis of Compiled Data

As has been previously indicated, the results of this study are presented in the form of the 17 charts which accompany this article. For convenience, this analysis is made in divisions related directly to the individual charts with cross references for the purpose of discussion and comparison

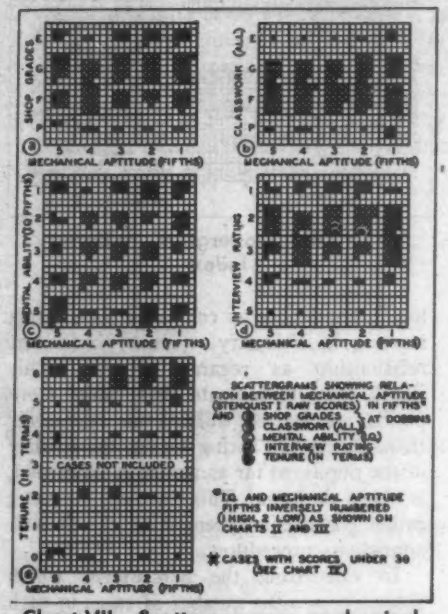

SHOP GRADES
CLASSWORK (ALL)
MECHANICAL APTITUDE (FIFTHS)
MENTAL ABILITY (IQ FIFTHS)
INTERVIEW RATING
TENURE (IN TERMS)
CASES NOT INCLUDED
SCATTERGRAMS SHOWING RELATION BETWEEN MECHANICAL APTITUDE (STENQUIST I RAW SCORES) IN FIFTHS AND
SHOP GRADES
CLASSWORK (ALL)
MENTAL ABILITY (IQ)
INTERVIEW RATING
TENURE (IN TERMS)
AT DOBBINS
* IQ AND MECHANICAL APTITUDE FIFTHS INVERSELY NUMBERED (1 HIGH, 5 LOW) AS SHOWN ON CHARTS II AND III
* CASES WITH SCORES UNDER 30 (SEE CHART III)

Chart VII. Scattergrams re mechanical aptitude

of the results. The following list represents an index of the charts and their contents, as well as the analysis thereof.

List of Charts

No. I. Admissions and tenure of the nine groups of pupils included in the study.

No. II. Distributions showing I.Q.'s of all cases except third-term dropouts. Also showing comparative distributions for extreme tenure groups (less than three terms versus four terms or more).

No. III. Distributions showing Stenquist I[10] raw scores for all cases except third-term dropouts. Also showing comparative distributions for extreme tenure groups (less than three terms versus four terms or more).

No. IV. Distributions showing interview ratings for all cases except third-term dropouts. Also showing comparative distributions for extreme tenure groups (less than three terms versus four terms or more).

No. V. Distributions of previous school grades for all cases except lower three terms of active pupils and third-term dropouts. Comparison of extreme tenure groups indicated by coding. (Less than three terms versus four terms or more).

[10]Stenquist Mechanical Aptitude Test I, *op. cit.*

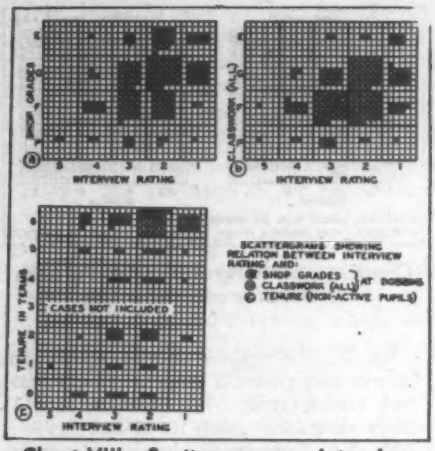


Chart VIII. Scattergrams re interview ratings

No. VI. Scattergrams showing relationship between mental ability (I.Q.) groups and:
a) Shop grades at Dobbins
b) Classwork at Dobbins (group A)
c) Classwork at Dobbins (group B)
d) Interview rating
e) Tenure of nonactive pupils

No. VII. Scattergrams showing relationships between mechanical aptitude in fifths and:
a) Shop grades at Dobbins
b) Classwork grades at Dobbins (groups A and B averaged)
c) Mental ability (I.Q.)
d) Interview rating
e) Tenure of nonactive pupils

No. VIII. Scattergrams showing relationship between interview rating and:
a) Shop grades at Dobbins
b) Classwork grades at Dobbins (groups A and B averaged)
c) Tenure of nonactive pupils

No. IX. Distributions of grades earned at Dobbins in
a) Shop
b) Classwork, group A
c) Classwork, group B

Also by coding, a comparison between the extreme tenure groups (less than three terms versus four terms or more).

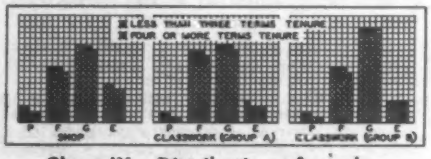


Chart IX. Distribution of grades earned at Dobbins

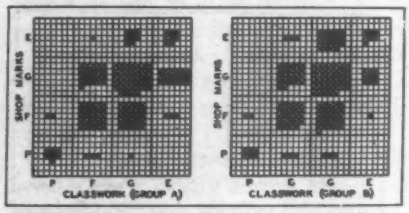


Chart X. Scattergrams re shop and class grades

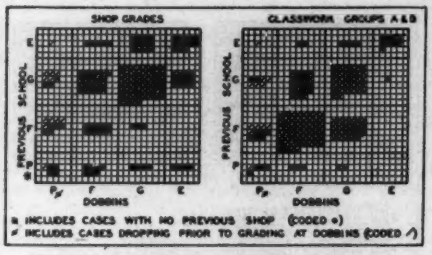

SHOP GRADES
CLASSWORK GROUPS A & B
PREVIOUS SCHOOL
DOBBINS
INCLUDES CASES WITH NO PREVIOUS SHOP (CODED o)
INCLUDES CASES DROPPING PRIOR TO GRADING AT DOBBINS (CODED /)

Chart XI. Scattergrams re class grades re Dobbins and elsewhere

No. X. Scattergrams showing relationship between shop grades at Dobbins and (1) classwork grades (group A) at Dobbins, and (2) classwork grades (group B) at Dobbins.

No. XI. Scattergrams showing relationship between grades at Dobbins in shop and classwork and grades in similar subjects at previous school.

No. XII. Scattergrams showing relationships between Index A* and (*a*) shop grades at Dobbins, and (*b*) tenure, in terms.

No. XIII. Scattergrams — showing relationships between** battery index and:

a) Shop grades at Dobbins
b) Classwork at Dobbins, groups A and B
c) Tenure, in terms

No. XIV. Scattergram showing relationship between shop marks at Dobbins and entrance age.

No. XV. Scattergram showing relationship between entrance age and term of separation (tenure).

Also indicates relationship of selective service age lower limit to tenure.

No. XVI. Distribution showing age at separation for both graduates and other non-active pupils.

No. XVII. Distributions of characteristics and success of pupils admitted *on trial*.

Chart I, in addition to summarizing the cases included in this study, provides a graphic picture of the tenure situation in this curriculum. With the exception of the group starting in the term beginning September, 1940, the drop-off is rather consistent. The graph clearly shows larger groups being adimtted in the terms starting in September as compared with terms starting in February, with no consistent relationship as regards drop-off. This would seem to indicate that, while more pupils are started during the fall terms than during the spring terms, the quality of the pupils, so far as tenure is concerned, is about the same. This, in turn, indicates rather consistent screening by the present admissions procedures.

In calculating the percentages which appear beside the number of cases in each tenure group, the number of dropouts was compared to the total possible cases for that term level. Thus, in calculating the percentage of graduates, the number 51 was compared to the total number admitted in groups 1 to 5, inclusive, which is 135, while in calculating the percentage of dropouts in the third term, the number 17 was compared to the total number admitted in groups 1 to 7, inclusive, which is 190. From the chart we see that one third (33.4 per cent) of all pupils admitted, drop out of this curriculum before reaching the third term. This compares very well with the findings of Fleming[11] whose data shows that for those pupils entering the Connelley Trade School between the ages of 14 and 17, the drop between the end of the first term and the end of the second term was from 30 per cent for the younger pupils to 37 per cent for the older pupils. This rate of dropping out would seem to indicate the need for attention in two directions. First, the rate might be reduced, either by more effective admissions counseling and selection, or by making the earlier work of the curriculum more attractive to those admitted. Second, granting some need for this high rate of dropout, then some attempt should be made to serve this group as a terminal program, with the essentials for employment at some level lower than that used as the objective for the whole curriculum. While this may be done by the present program of courses, the existing program should be examined in light of this dropout chart.

While the dropouts in the early terms compares closely with Fleming's findings, the percentage of pupils remaining for six terms is better than three times as high as he found. That is, while the percentage of

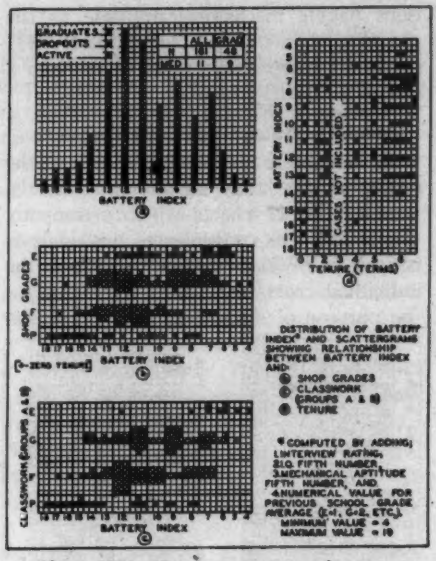

GRADUATES
DROPOUTS
ACTIVE
ALL GRAD
BATTERY INDEX
TENURE (TERMS)
CASES NOT INCLUDED
SHOP GRADES
CLASSWORK (GROUPS A & B)
DISTRIBUTION OF BATTERY INDEX* AND SCATTERGRAMS SHOWING RELATIONSHIP BETWEEN BATTERY INDEX AND:
SHOP GRADES
CLASSWORK GROUPS A & B
TENURE
*COMPUTED BY ADDING; 1.INTERVIEW RATING, 2.I.Q. FIFTH NUMBER, 3.MECHANICAL APTITUDE FIFTH NUMBER, AND 4.NUMERICAL VALUE FOR PREVIOUS SCHOOL GRADE AVERAGE (I=1, G=2, ETC.). MINIMUM VALUE = 4 MAXIMUM VALUE = 19

Chart XIII. Scattergrams re battery index

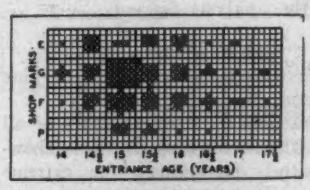


Chart XIV. Scattergram showing shop marks vs. entrance age

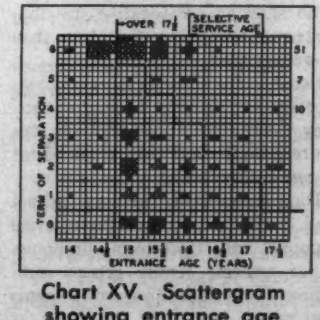


Chart XV. Scattergram showing entrance age vs. term of separation

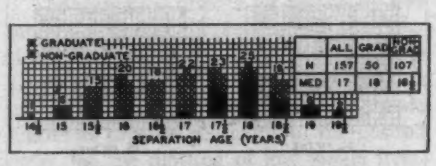


Chart XVI. Distribution of separation age

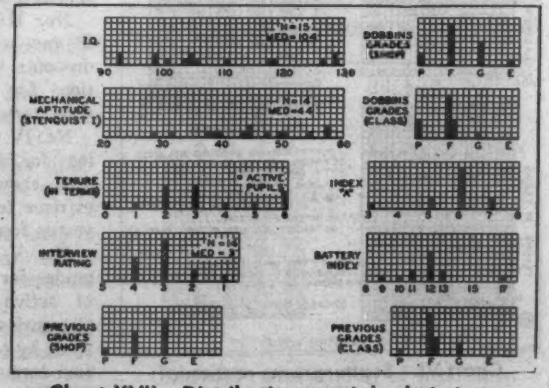


Chart XVII. Distribution re trial admissions

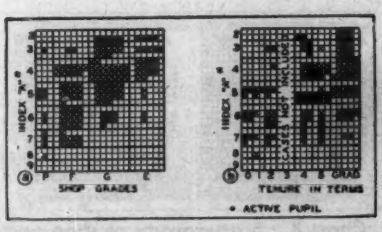


Chart XII. Scattergrams in re index A

*Index A computed by adding interview rating to numeric average of previous school grades (E–1, G–2, F–3, P–4).

**Battery index computed by adding interview rating to I.Q. and mechanical aptitude fifth group numbers and the numerical average of previous school grades (E–1, G–2, F–3, P–4). Minimum (best) value — 4. Maximum (poorest) value — 19.

[11]Fleming, J. W., *op. cit.*, p. 161, Chart No. 1.

pupils completing six terms of work in this curriculum is 37.8 per cent, the percentage Fleming found for pupils entering between ages 14 and 17 ranges between 7 and 16 per cent. Fleming's best figure for pupils completing six terms of work is 20 per cent, which appears in his chart No. 3 for pupils with I.Q.'s above normal (110–139).

There appears to be some tendency to reduce the rate of dropout, at least in the lower terms. In groups 2 to 5 inclusive we find 49 dropouts in the first two terms out of 125 admissions, giving a percentage of 39.2 per cent as compared with the overall of 33.4 per cent, and a percentage for the more recent groups 6, 7, and 8, of 31.3 per cent, or 23 dropouts in two terms out of 72 admits. This would indicate either improved admissions procedure or improved holding power of the curriculum, or both, for there are no marked differences in other factors, such as employment opportunities, between the period February, 1941, to September, 1943, and the period February, 1943, to February, 1945.

Chart II presents a picture of the group under consideration in terms of one of the characteristics being considered, I.Q. As was previously mentioned the I.Q. used was that given by the Philadelphia Mental Ability Test, Form BIII.[12] The range for all cases except those dropping out during the third term is 91 to 142, with a median of 112, and a Q of 8. The distribution is skewed to the right showing the effect of chopping off the lower I.Q.'s in the selective process. There is no significant difference between the I.Q.'s of those dropping out before the third term and those staying four terms or more. The apparent discrepancy between the medians of the distribution of all cases and the median of the dropouts before the third term is caused by the presence of the active pupils in the all case distribution. This indicates a somewhat lower I.Q. level for the active pupils. The graduates in the distributions were coded to determine any significance of I.Q. on that basis. The one point advantage over the early dropouts would seem not to have much meaning.

On the *all case* distribution is indicated the grouping by fifths which was used in making correlation studies on Chart VI. The numbering is inverse, making one high and five low, in order to correspond with the order of numbering used for interview rating.

(To be continued)

[12] Philadelphia Mental Ability Test, *op. cit.*

Problems in Supervision and How to Meet Them

WALTER B. JONES
Consultant in Teacher Education
Rio de Janeiro, Brazil
On leave from the University of Pennsylvania

(Continued from page 374 of the November, 1947, issue)

Observing and Evaluating Teaching Procedures

What methods have you developed for observing and evaluating teaching procedures and achievement of the objectives in the war-production classes?

"By standardizing course outlines, evaluation was made by observation and comparison."

"Rating of teachers was made each budget program period; ratings anticipated by senior teacher in charge of each center. Self-ratings were made in some centers subject to review."

"Supervisors visit teachers at least once each day."

"At least one detailed observation is made each day."

"The appointment of a group leader who carries on this work in conjunction with regular teaching duties."

"Production of each class compared with materials consumed and percentage of acceptable jobs arrived at."

"Providing series of tests based on outlines used by teacher — administered and evaluated by group leaders."

"Planning for observation of trainee's success on his job in industry."

"Visit classes at frequent intervals and interview students at work. If undue difficulty, feeling of frustration, or feeling that time is being wasted exists, have conference with instructor."

"Sheet for evaluation of each teacher prepared — provides comparable record."

"Ratio of number of trainees assigned to number of graduates and placements serves as check on teacher's abilities."

"Fidelity with which teachers follow definite, clear-cut course of study indicates whether teacher produced or didn't produce."

Correcting Instructor's Mistakes Without Finding Fault

After inspection and evaluation, what methods do you use to correct the instructor's mistakes without seeming to be finding fault?

"In cases of habitual mistakes, demonstration lesson may be given by supervisor."

"Visit other classes similar to his own where supervisor will point out to teacher 'A' mistakes being made by teacher 'B' especially where mistakes are similar to those made by teacher 'A.' Teacher 'B' is always notified before actual class visit."

"Assists instructor in preparation of special job sheets in the process of which supervisor will discuss with teacher correct and incorrect methods of presentation."

"Simply present the mistake frankly and clearly and ask for explanation or defense. First establish reputation for being helpful to teachers."

"Understand both sides of the case for which teacher is about to be corrected."

"Give praise when due. When teacher gets no praise or encouragement he knows that something must be wrong. Unassisted correction of mistakes will usually result."

"Suggest trying a new technique or procedure giving examples of its successful use elsewhere, and on other occasions without referring directly to the situation at hand."

"Send a general notice to all teachers with improvement suggestions so that the criticism does not seem to be directed to any one person."

"Have a committee discuss the problem involved in a faculty meting, in a general way without any specific references."

"Wait until an acute situation develops

in which instructor finds it necessary to appeal to supervisor for assistance."

"Furnish instructor with magazine articles and other aids."

"Have a plain, frank talk about the situation."

Acquiring Good Housekeeping Habits

How can the supervisor help teachers to develop good housekeeping habits?

"Some teachers by nature are good housekeepers, and need only praise and encouragement. Others are characteristically poor housekeepers and they find it very difficult to overcome the habits of a lifetime."

"It is difficult to get some teachers to develop habits of good housekeeping. Some do not feel that this is necessary. Some are not able to organize their shops and toolrooms in such a way that they can be kept in order. Some have the attitude that if there isn't evidence of some messiness there isn't any work going on. Our counterargument is, of course, that there is generally good work going on in a neat, clean plant, and that modern industry is highly organized and superclean."

"Probably there are two ways of obtaining results in this regard: (1) to generate that spark of inspiration within the teacher by having him visit other shops which have good showmanship, (2) to urge strongly, or practically demand it, which generally doesn't work."

"Inspect routinely with praise, encouragement, and criticism."

"Have daily toolroom reports turned in by toolroom attendants."

"Place locks on all machines and require permission slips for use of machines. These are signed by the student and the instructor and are turned in daily."

"Make use of such occasions as the annual exhibit, visits by supervisors of the state department, visits by neighboring plant officials as an excuse for a thorough spring housecleaning job."

"Instruct the teacher in pertinent elements of shop management and use of practices and devices which will motivate pupils to keep their work station clean."

"Include good housekeeping in the regular course outline."

"During visit make constructive criticisms to teachers in regard to shop organization, cleaning shop, teachers' records, etc."

"Encourage teachers with poor housekeeping habits to visit shops in which housekeeping is excellent."

"Discuss development of generalized habits in group meeting of teachers."

"Make suggestions in form of a request rather than that of a complaint."

Supervision of Poor Teacher vs. That of Good Teachers

Is more supervision needed for less well-qualified teachers than for good teachers? How have you provided for this situation? What is the approximate teacher-supervisor ratio in your jurisdiction?

"A good teacher doesn't need supervision. An occasional chat is sufficient."

"Emergency teachers are usually willing to learn. It is the regular teacher who considers WITP a gravy train, that needs to be pushed."

"Less well-qualified teachers do not necessarily require more supervision but rather more intelligent supervision. Weaknesses should be detected and methods devised for correcting them. Time should be a secondary consideration."

"Group leaders have been appointed especially to aid less well-qualified teachers."

"Amount of supervision required for good teachers and less effective teachers differs, but both need supervision."

"Certificated teachers needed help in resourcefulness when assigning jobs, admitting new trainees, giving related instruction, including safety instruction."

"Some day-school teachers required upgrading to help them to teach adults."

"Teaching women proved too difficult for some teachers. Transfers were effected in these cases."

"Many good teachers require new interests and encouragement to prevent them from becoming stale on the job."

"Teacher-supervisor ratio was reported variously as: 30 to 1, 50 to 1. It was at peak at 100 to 1."

"With a group of good teachers, supervisors can handle an unlimited number. Number decreases as abilities of teachers decrease. Worst cases require constant individual supervision."

"Considering group leaders as supervisors the ratio is about 10 to 1."

Supervising Classes on Late Shifts

How can the supervision of classes on late shifts be made more efficient?

"Supervisors are prone to threaten but never act."

"Closing of several classes proved the point of the question and has brought about much needed reform."

"Communities more often close classes too soon because of insufficient attendance before making a genuine effort to build up the classes by proper publicity."

"Assign the most competent, resourceful supervisor to this shift. He must be made to understand that he is not assigned to the least desirable hours because of lack of ability but rather because the job requires a man of outstanding ability."

"A bonus for night shift supervisors would help."

"Give late shifts same attention and

A portable electric sander is used by the students of the woodworking shops at the Washburne Trade School, Chicago, Ill.

supervision as that afforded early shifts and there should be little difference in results."

"Reduce program to regular evening school hours and try improving attendance before closing class entirely."

"Supervisors should aid teachers to encourage trainees to continue on roll by well-presented arguments — free training, increased skill, increased wages, etc."

"Development of proper teacher attitudes and close observance of trainees' records can prevent falsification."

"Lax supervision encourages teachers to take a chance."

Rating of Teachers

How is the rating of teachers performed in your program?

"Teachers requested to take short courses at least once a year in teacher training, or foremanship training. These ratings are valuable in forming judgments."

"Rated twice a year. Made jointly by senior teacher of the school and subject supervisor. In addition teacher is asked to rate himself. Discrepancies indicate need for supervision."

"Rating made on 5-point scale on following points: individual instruction, theory and related work, preparation of materials, shop management, care of shop, records, professional attitude, shop specialties."

"No occasion for any special rating; when necessary we can produce opinions based upon usual criteria for rating instructors."

"No official rating system. Worth of the teacher based on subjective judgment of the supervisors."

"Bawling Out" Instructors in Presence of Class

Bawling out an instructor in front of the class is resented by instructors. Is it ever justified?

"Rightfully resented, never justified, reprimand in private."

"I have been repeatedly criticized openly in front of the class for not having the shades and windows all at a uniform height. In some cases it is much more sensible to have them at various heights."

"If a supervisor expects support he should treat his instructors as human beings; not stare through them as he comes in and refuse to speak and glare around the classroom or shop."

"Give useful suggestions to the instructor in a quiet way but not publicly in front of the class."

Joint Supervision of Teachers

What procedure should be used where two or more supervisors have joint supervision over teachers?

"This is a dangerous practice. Teachers like to have only one person as a supervisor. He should be their immediate superior and all orders should emanate from him."

"Necessary to have full agreement on course outlines, methods, and procedures."

"If time of service of two or more supervisors is concurrent, specific phases of supervision should be divided between them. If time is not concurrent and supervisors operate on an end to end assignment, they must keep each other fully informed as to what they have done, what they intend to do, preferably by putting much of this information in writing; and supervisors should have daily conferences about various phases of their work."

"Tendency is to assign only one supervisor to a teacher."

Insuring Consistent Use of Safety Devices

How do you insure the consistent use of safety devices in shops under your supervision?

"Determine the hazard; instruct so that the hazard is eliminated from the operation."

"Take a positive approach."

"Give constant supervision and check constantly."

Advisory Committee Procedure

In working with advisory committees what techniques of organizing, selecting committee personnel, and conducting meetings do you recommend?

One of the outstanding contributions of the war-production program to vocational education was the extensive use of the advisory committee.

A highly recommended plan for the selection of advisory committee personnel and conduct of meetings is presented below. Purposes of committees are included:

Selection of Advisory Committee Personnel[8]

I. General Advisory Committee

We have found it most satisfactory to use the following procedure:

1. Determine the organized groups which should be represented. In our city the following organizations were selected because of their particular sphere of influence in the community: The Chamber of Commerce, The Merchants Association, The American Federation of Labor, Central Labor Council, and the County Council of the Congress of Industrial Organizations.
2. On the first of August each year, the board of school trustees requests the superintendent of schools to forward a letter to the president of each organization named, asking them to recommend two or more qualified candidates from their organization from which an appointment to the advisory committee might be made that would be completely acceptable.
3. Upon receipt of the nominations from each organization, a complete investigation of each man's background is made. The official ap-

Cutting patterns on an oxy-acetylene flame-cutting machine. Hobart Trade School, Troy, Ohio
— Courtesy, Hobart Brothers Co., Troy, Ohio

[8]Statement by teacher trainer: "I have made no attempt to abstract this statement. I consider this advisory committee setup, by all odds, the best in the state."

pointment of one representative from each organization follows. Official announcement is made to the organization and to the community.

4. The director of vocational education is then ordered by the board of school trustees, through the superintendent of schools, to advise each new member of his complete responsibility.
5. The first meeting is called for the purpose of organization, at which time the committee elects its own chairman. Meetings are called by the chairman usually once each month.

II. Trade Advisory Committees

1. The need for these subcommittees is determined by the general committee usually based on the number of different trades represented in the training program.
2. If there seems to be a need for sheet-metal training in any division of the program, day school, evening school, or apprentice program, for instance, a list of prospective candidates, two representing labor in this trade and two representing management, are submitted to the general advisory committee for approval by the director of vocational education. If acceptable, the director appoints the trade committee and begins work on specific training problems in this field. A report of each trade committee meeting is made to the general committee.
3. Trade committees are appointed each year for the regularly offered subject fields, such as machine trade, carpentry, auto mechanics, drafting, electricity, etc. These committees continuously review the training being offered, recommend improvement, expansion, or curtailment in response to the needs of the community.

III. Committee Meetings

All committees elect their own chairmen who preside at each meeting. The director acts as secretary and provides a complete report of each meeting to each member of the trade committee as well as the general committee. All committee representatives are urged to report each meeting to the organization which they represent.

The director provides the chairman with an agenda of problems needing attention at each meeting. Often other problems not listed are presented by members for discussion.

No final vote is ever taken on any problem until the general discussion discloses the possibility for an unanimous decision.

IV. Purpose of Trade Committees

To act in an advisory capacity to the industrial co-ordinator and vocational director on matters of policy concerning training needed or offered in their respective trade. For example:

a) Assist in conducting informal surveys to determine need for training.
b) Use results of survey; advise where training can most profitably be given, day school, evening school, or apprentice school.
c) Assist in preparing or approving general plan and scope of material to be taught.
d) Suggest most capable tradesmen in the community who might be selected as competent instructors.
e) Assist in setting up standards of entrance requirements for all training offered.
f) Assist in establishing standards of accomplishment for trainees.
g) Analyze results of training to determine whether or not the needs of the community are being satisfied through training offered.
h) Constantly strive to maintain a sound working relationship between organized labor, industrial management, and the school, through clear understanding and co-operative planning.

V. Purpose of General Advisory Committee

To act in an advisory capacity to the board of school trustees on all matters of vocational education, for example:

a) Suggest surveys to determine needs for trade and industrial training.
b) Assist in evaluating results of surveys to determine community training needs.
c) Assist the board in seeing that community training needs are satisfied by a flexible vocational program.
d) Assist in the promotion of all phases of such a training program.
e) Analyze training given to be sure it is measuring up to community needs.
f) Analyze organization and operation of training program to insure proper selection of trainees, proper standards of training, and proper placement of trainees.
g) Review the work of each trade advisory committee to see that proper working relationships are being maintained between organized labor, management, and the school for the promotion of a sound vocational program.
h) Act as a board of appeal on any important matter which cannot be satisfactorily decided upon by any trade committee.

Liaison Officer Between Teachers and Higher Officials

In acting as a liaison officer between teachers and higher officials what methods have you found successful?

"Report only facts and conditions as they exist."

"Develop relationship which will command respect from both teachers and higher officials."

"Teacher's welfare and well-being should be evident in supervisor's field reports."

"Higher official's affairs should remain his business."

"Solve individual as well as group problems as follows:

a) Have teacher determine clearly just what he wants or what he needs.

b) Determine proper channels through which the teacher's problems should be directed.

c) Help the teacher put his problem in writing.

d) Send written request of the teacher with letter of transmittal to proper authorities.

e) Arrange for personal interviews if necessary."

"Should have clear-cut statement of policy on the part of higher officials and wholehearted co-operation of those on the 'firing line.' "

"Be honest and lay the cards on the table."

"The liaison officer must interpret the policies of his superiors to his teachers as clearly and as intelligently as he can. He must be able to understand the viewpoints of his instructors and to present these viewpoints without prejudice. His personal ambitions and viewpoints must be subordinated to those of his co-workers."

(To be continued)

School's out, watch out. Among children in the 5–14 age group killed or injured in traffic, one out of six was coming from behind a parked car, and one out of four was playing in the roadway. — *National Safety Council.*

Industrial Arts and Vocational Education
John J. Metz, Editor

THE SOLACE OF LABOR

Recently the writer overheard a charwoman bemoaning her sad fate. She said to her fellow worker: "I started doing this work when I was 19. Now I am 55, and I am still at it."

No doubt her janitorial tasks were not easy, and 36 years at that kind of work, represents quite an expenditure of energy. Yet, its drudgery would not have weighed her down, had she maintained the right attitude toward her work.

This woman, as is usual with this type of work, had a part-time job. That in itself is advantageous, especially from the viewpoint of a married woman. The very fact that she had held this or similar jobs for 36 years showed that the work must have had some appeal, even if it was only a monetary one.

Assuming that the income from that job was extremely necessary for the support of herself and family, her self-pity was still uncalled for. It surely did not make her work easier and most likely had no good effect on her co-workers.

All work is more or less disagreeable. The worker can make it more agreeable, however, by making the best of things, or if he cannot do that, take up other work as soon as possible. There is no need to embitter one's whole life with something that is distasteful unless one has allowed himself to find all work distasteful.

Have we as teachers an obligation to help our students to get the right perspective on labor? Among our pupils there may be some who have very high ambitions without having the mental endowments necessary to achieve them. Many a boy wants to be a doctor but his high school standings bar him from even entering a medical school. Such a boy must make another choice of occupation and it may be a severe adjustment for him. Can we prepare him to make this adjustment while he is attending the elementary and secondary schools in which we teach? Is it not worth while to help him enter the work cycle of his life with a feeling that one of the best things in his span of human existence is the privilege of doing some kind of honest and useful work? If a worker thoroughly enjoys what he is doing — fine. If he doesn't, and makes himself like it, he is no doubt doing a good piece of work and at the same time making a better man of himself.

A conscious effort to give correct life attitudes to our students is a duty which we as teachers ought to perform. Let us be sure not to forget what they need in the work period of their existence. That work period, most likely, will occupy a great part of their lives; let us help to make it happy.

A CRUEL REMINDER

Fire Prevention Week was over for a scant two months when the newspapers informed the country that great fires were devastating thousands of acres of forest land in Maine and elsewhere.

Someone had not taken the fire prevention warnings sufficiently to heart. Probably that someone had not come into contact with anyone who was preaching the fire prevention gospel. At any rate, those fires did very serious damage, irreparable damage, because millions of feet of badly needed lumber were destroyed without doing anyone any good.

Besides the trees, many homes and barns, yes, entire settlements were destroyed. Strenuous efforts were made to smother the flames, but without avail. Fire fighting is no easy work, and it is dangerous as well. Large numbers of men took part in it. Their toil and labor also were wasted. Why?

It is useless to conjecture how those fires started. A spark from a passing locomotive may have set some dry grass or leaves afire, and being unnoticed, the flames spread until they could no longer be mastered.

A spark from a smoker's pipe, or a burning cigar or cigarette stub may have been carelessly or thoughtlessly cast aside. Or some camper was careless about putting out his fire, or sparks from some settler's chimney started the conflagration. However it happened, the damage is now done, and all that we can hope to accomplish is to arouse everyone to be cautious and vigilant so that future needless fires may be avoided.

You and your students may be far removed from where these fires occurred, but if every instructor took it upon himself to place the matter of fire prevention before his students in a dynamic way several times during this school year, it might probably reduce the immense fire losses which had reached the enormous total of $641,816,000 during the year ending July, 1947.

THE A.V.A. CONVENTION AT LOS ANGELES

The American Vocational Association Convention will be held this year at the Biltmore Hotel, Los Angeles, Calif., December 15, 16, 17, and 18. It is just twenty years since that city was host to this national association.

This bit of information may or may not mean anything to thousands of our readers. Nevertheless, that convention will be attended by several thousand readers who will derive great benefits from their attendance there. It is, of course, impossible for every teacher of industrial arts and vocational education to be at liberty to attend the convention meetings, even if the convention were held in their own community. There are many, however, who could go to these annual meetings if their professional spirit were a little more fervid.

Los Angeles, of course, is somewhat far removed from those teaching and supervising the shopwork in the schools located in the Middle West and in the East. But many in the West, who could, without too much trouble, get leave of absence for a day or two to come to the convention at Los Angeles, will not even make the attempt.

To get a good résumé of what Los Angeles is offering the convention visitor, the reader is referred to the excellent article, "Industrial Arts and Vocational Education in the Convention City," written by C. E. Nihart, who is head supervisor of vocational and practical arts education of the host city.

Then, starting on page 21A is a forecast of the many thought-provoking addresses that will be given at the convention. The names of the speakers are proof enough that their contributions will be more than worth while. The West has much to offer in many ways. The convention this year ought to draw a large attendance, if for no other reasons than the over and above features that are offered. Make no mistake, the convention at Los Angeles will be good.

Some Leaders in Industrial Education

WILLIAM T. BAWDEN
Director of Publications
Kansas State Teachers College
Pittsburg, Kans.

(Continued from page 321 of the October, 1947, issue)

Frederick Gordon Bonser

So far as the record shows, the subject of this sketch never held a position as teacher of any type of shopwork or drafting. He was never employed as supervisor or director of industrial arts in a school system. He was not the author of a textbook on the technical details of tools, materials, and operations of shop teaching. And yet he deserves a prominent place in this galaxy of leaders because of his outstanding contribution to the development of industrial arts as we know it today.

Early Life

Frederick Gordon Bonser was born on a farm in central Illinois on June 14, 1875, and died at his home in suburban Leonia, N. J., only a few miles from the Teachers College campus, on June 8, 1931.

He was the son of Aaron and Eliza Stevens Bonser, and the oldest of six children. His father came with relatives from Ohio to Illinois in a covered wagon. He made his home on a farm a few miles east of Pana, approximately 50 miles southeast of Springfield, and it was here that Frederick was born, in a log cabin.

As a boy he was not robust, and he was not sent to school until he was seven years of age. Even then, his first school days were filled with painful and disagreeable experiences because of his natural timidity and shyness. His sisters, recalling events of his childhood, after his death, described him as inheriting his mother's quiet, sensitive qualities of personality, and his father's sturdy pioneering attitude toward life's problems, albeit he was handicapped somewhat by the lack of the hardy physique and boisterous vitality that we commonly think of as characteristic of frontier life.[1]

Even as a boy he must have exhibited a high degree of effort and determination, and set for himself definite plans to be carried out and goals to be achieved. Although the evidence shows that "he grew up with an almost overwhelming timidity and bashfulness," he struggled against this trait to the extent of manifesting certain qualities of leadership both in his school assignments and on the playground. For example, during his rural school days he was a faithful reader of *The Youth's Companion*, and like many another boy was intrigued by the premiums offered for securing new subscriptions. On one occasion "he secured enough subscriptions to the magazine to win a magic lantern. He then conducted magic lantern shows on Friday afternoons for some time at the schoolhouse."

Another illustration is given of his achievements in the struggle to overcome the handicap of reticence and bashfulness:

"It was the custom in the rural areas of Illinois during the late eighties and nineties to hold what were known as 'singing schools,' sometimes in connection with parties or dances, and sometimes as independent events in themselves. Bonser, as one of the older pupils in the rural school, himself organized and conducted a singing school at the schoolhouse."

High School and University

There being no high school near his home, he went in the fall of 1893 to live with an uncle at Avon, Ill., and enrolled in the regular four-year course in the high school in that village. Avon is about 20 miles south of Galesburg, and approximately 160 miles from his home. He entered upon this work with enthusiasm, regarding it as a privilege and an opportunity. By great industry and application he accomplished somewhat more than the first two years of the high school course in one year.

Frederick Gordon Bonser

"It developed in the fall of 1894 that, in spite of his having enrolled only the year before, he would be able to graduate the following spring. This fact made him a member of the Class of 1895; and so in October, he quietly set about to organize the class of nine members. He was elected president, and Miss Florence Fennessey, who has kept a record of the class members' activities from that time until now, was elected secretary. The class held regular meetings. Strange to say, these meetings were not concerned with the planning of parties, but usually with school work. The practice was to present papers on science, government, or any field of interest that held their attention."

In addition to organizing the "Class of 1895," Bonser was also the leading spirit in organizing and conducting a "literary society," called the Philomathic Society, which held regular meetings.

In January, 1895, a traveling hypnotist came to Avon, and gave a demonstration-lecture. When volunteers from the audience were called for, "Bonser forgot his reticence and was the first on the stage." As a direct result of this experience, Bonser became absorbed with the subject of hypnosis, and began to read everything he could lay his hands on regarding it. He even did a certain

[1]Raymond W. Phipps: *Frederick Gordon Bonser: A Biographical Study of His Life and Works.* Unpublished Thesis, Ohio State University, Columbus, Ohio, 1935. Size, 8½ by 11 inches; 113 pages; appendices, 163 pages. An excellent biographical study, remarkably painstaking and thorough. With the permission of the author, I have drawn upon this study, indicating those passages which I have quoted directly.

amount of practicing the art upon his classmates in the high school, and upon his younger brothers and sisters when he returned home for the summer. "This led to an intense interest in psychology, which he later made his major field of study at the University of Illinois, and still later at Columbia University."

Following graduation from the high school at Avon in 1895, he entered the University of Illinois, at Urbana, in September of that year. After two years at the University, he was offered a position as teacher in a rural school, which he accepted. At the close of this year, having developed a cough that became somewhat alarming, he acted on the advice of members of his family and went to the farm home of an uncle near Walla Walla, Wash. Here he worked in the harvest fields during the summer, 1898, and in large measure regained his health and strength. In the fall he secured a position as teacher in the Union District School, near his uncle's home, at $40 a month, and in the spring he was offered the school at Valley Grove for the spring term at $45.

"It is known that, through the experiences of these two years in the country schools of Illinois and Washington, the decision to make education his life work was definitely reached. In his work as a country school teacher he put forth his most intense efforts to be the best possible worker interested in school affairs."

Graduate Study

Returning to Illinois in the late summer of 1899, "with his health decidedly improved, his mind definitely made up as to his hopes and ambitions regarding a life career, and an even more amazing capacity for hard work," he re-entered the University of Illinois in September, and received the degree of bachelor of science in 1901.

Following graduation, it was his good fortune to be awarded a graduate fellowship in psychology, which made it possible for him to continue his studies at the University of Illinois, where he received the master of science degree in 1902.

"During this year of graduate study he made three important contributions: (1) A Statistical Study of Illinois High Schools; (2) Chums: A Study of Youthful Friendships; and (3) The Relationships of Mental Activity and the Circulation of the Blood. These studies were quite exhaustive, and each was sufficient in itself to meet the requirements of a strong master's thesis."

The Normal School Years

In the fall of 1902, Bonser was appointed professor of education and director of the training school at the State Normal School, Cheney, Wash., where he remained three years.

In the spring of 1905, he received the award of a graduate fellowship at Columbia University, which he accepted. He spent the year, 1905–1906, in graduate study at Teachers College.

In September, 1906, he was appointed professor of education and director of the training school at the State Normal School, Macomb, Ill., where he remained until 1910.

Personal Contacts

It was during this latter period that I met Professor Bonser for the first time, while I was head of the department of manual arts at Illinois State Normal University, Normal. I was invited to read a paper before the Elementary Schools Section of the 55th annual convention of the Illinois State Teachers Association which met at the State Capitol in Springfield during the Christmas vacation, December, 1908. That was before the Association was reorganized into district meetings, as now. It was also before the organization of a separate section or meeting for teachers and supervisors of manual training. Speaking before an audience of elementary school principals and teachers, I chose for my subject, "Objectives and Program of Manual Training in Public Schools."

When I arrived in Springfield, and secured a copy of the official program of the convention, I learned for the first time that the speaker who was to follow me was Professor F. G. Bonser, whose subject was, "Vocational Work Below the High School." There was no opportunity for an introduction before the program, and so our first meeting was "on the floor," so to speak.

It was a memorable occasion for me, for I remember I felt quite nervous at the prospect that my paper was to be followed by and compared with that of a prominent educator (whom, incidentally, I had never heard of before), not a manual-training man, from a rival institution. After I sat down, Professor Bonser was introduced. Before beginning to read his paper, he asked permission to comment briefly on certain points made by the preceding speaker. I experienced what is sometimes euphemistically referred to as a sinking spell.

This did not last long, however, for he quickly made me feel at ease by singling out one or two statements for approval and commendation. He then went on to select one or two statements for more critical analysis. Without especially urging his own views, he asked some searching questions which convinced me that I was listening to a man who had thought more deeply and more effectively on some of these problems than I had, even though he was not a "manual-training man."

It was a most stimulating and wholesome experience for me, which I have never forgotten. I have recalled it many times as I have reflected upon the circumstance that all too often the industrial-arts teacher is effectively insulated from contacts with those who are qualified to offer an expert appraisal of his objectives, his course of study, and his methods of teaching. In many high schools, from the beginning of the school year to the end, the industrial-arts teacher does not see or talk to anyone who knows as much as he does about what he should be accomplishing, and how, and why. This is not good for the teacher, or for his boys — for the school, or for industrial arts.

As I became better acquainted with Professor Bonser, I observed that he had a keen, penetrating mind. He was an indefatigable student. He did not fail to perceive the faults or weaknesses in the treatment of any subject with which he was conversant, and he did not hesitate to point them out. And yet, he was always a kindly and considerate critic.

During the four years at the State Normal School, at Macomb, Bonser "gained a solid reputation as an able judge of educational values. He successfully promoted the practical applications of the Dewey philosophy, and added to them his own shrewd, capable practices. . . . He was at least a generation ahead of his time. Prominent educators came from all over the country to observe and evaluate the Bonser practices and results in the Training School at Macomb."

Career at Teachers College

We met only once more, I think, during the year and a half following the meeting in December, 1908. In the fall of 1910, Dr. Bonser was appointed professor of education at Teachers College, Columbia University, New York.

The title of his doctor's dissertation was, The Reasoning Ability of Children in the Fourth, Fifth, and Sixth Grades. In this study, in 1905–1906, he gave a series of tests to 757 children in the schools of Passaic, N. J. Nine years later, while a member of the faculty of Teachers College, he made a follow-up study for the purpose of "discovering whether, and to what extent, the distribution and success of individual pupils indicates any selective significance in the results of the reasoning ability tests."

With the appointment to the faculty at Teachers College came the opportunity to capitalize on the creative work accomplished in the State Normal Schools at Cheney, Wash., and Macomb, Ill.,

and to make full use of the new enthusiasm and broadened horizon generated by graduate study at the University of Illinois and at Teachers College. This period, from 1910 to 1930, was one of intense and unremitting labor, that doubtless hastened the end; it was also a period of satisfying personal growth, ever widening influence, and prodigious achievement.

Backed by the prestige of Teachers College, stimulated by contacts with brilliant associates in the Teachers College faculty, and afforded the opportunity of supervising the studies of an increasing number of able graduate students, Dr. Bonser grew with his colleagues, more than held his own, and became one of the outstanding leaders in a galaxy of leaders in a brilliant period in the history of Teachers College.

Personal Contacts Renewed

In the fall of 1912, I returned to Teachers College, to carry out a long-cherished plan to work for the doctor's degree. It was my good fortune to learn that Dr. Bonser had been appointed chairman of my advisory committee. The other members were Dr. Edward L. Thorndike, and Dr. George D. Strayer. My major field was designated, Administration of Industrial Education. My recollection of the details of those two years is now rather vague and hazy, but I recall at least one course with Dr. Bonser, a Seminar in Industrial Education, which met twice a week. In addition, there were numerous conferences with him as my adviser, especially after I began work on my dissertation.

His was an attractive personality, as acquaintance developed into a real friendship — he was a delightful man to know, entirely aside from his professional attainments. There was ample evidence of his popularity with students and of his influence among his colleagues of the faculty. After I left Teachers College, in June, 1914, we met occasionally at educational conventions, and only a few times exchanged correspondence. Our paths did not cross very often, and for this I have always been sorry.

Extracurricular Activities

During his term of service at Teachers College, 1910–31, Dr. Bonser specialized in industrial arts, practical arts, and elementary education, although his major interests were extensive and his professional contacts were numerous. He did an immense amount of extracurricular work in the form of public addresses, contributions to professional and other journals, published books and reports, participation in surveys of various types, and in other activities.

In 1918–19 he was a member of the Columbia University Committee on the Rehabilitation of Disabled Soldiers.

In 1925 he was a member of the Educational Survey Commission that made a study and report on education in the Philippine Islands. In connection with this survey, he made a trip around the world, observing social conditions and educational practices in various countries in the Far East and elsewhere.

In 1927 he was a member of the Educational Survey Commission that made a study and report on the State System of Public Education in Virginia.

In 1929 he was a member of the Survey Commission that made a similar study and report for the state of New Jersey.

Publications

It is impracticable to use the space necessary for a list of Dr. Bonser's contributions to educational literature. In one of the sources consulted, I found a "partial" bibliography occupying nearly 20 printed pages. In addition to innumerable magazine articles, he was author of:

A Statistical Study of Illinois High Schools (Urbana, Ill.: University of Illinois Press, 1902).

Necessity for Professional Training for Vocational Counseling, Bulletin, 1914, Number 14, United States Bureau of Education, Washington, D. C.

Chums: A Study in Youthful Friendships (Urbana, Ill.: University of Illinois Press, 1902).

Reasoning Abilities of Children, Bureau of Publications, Teachers College, Columbia Universty, New York, 1920.

The Elementary School Curriculum (New York: Macmillan, 1920).

Industrial Arts for Elementary Schools (with Louis C. Mossman) (New York: Macmillan, 1923).

Industrial Arts for Public School Administrators, Bureau of Publications, Teachers College, Columbia University, New York, 1930.

And finally, following Dr. Bonser's untimely death, a committee, consisting of former students and former associates on the faculty of Teachers College, assembled, edited, and published a collection of his addresses, magazine articles, and other writings, under the title, *Life Needs and Education*, published by the Bureau of Publications, Teachers College, Columbia University, New York, 1932, 288 pp.

This is a highly significant collection of writings, representing all the important stages of Dr. Bonser's professional career. The members of the committee who co-operated in the production of the book are: Maurice A. Bigelow, Benjamin R. Andrews, Lois C. Mossman, Florence B. Stratemeyer, Cora M. Winchell, Helen Judy-Bond, Jean Broadhurst, Sara L. Patrick, Fred J. Strickler, Fannie W. Dunn, and Mabel Carney. In an Introduction, Dr. William H. Kilpatrick, fittingly says:

"Concreteness and range of interest were two pronounced characteristics. It was given to Professor Bonser as to few others to translate his insight into actual steps feasible to be taken by any who would but try. The chapters that follow illustrate this, while at the same time they testify to the unusual range of his interests and contributions. Few or none carried finer insight or effectual concreteness into more fields of educational work. Note the range of topics treated: the first three grades, elementary education, secondary education, industrial arts, home economics, art education, fine arts, music, curriculum making, teacher training, developing creative ability, life's satisfactions.

"And through all the chapters as throughout his life we find one consistent philosophy at work, the effort to use life for the enrichment of life. It was this which Professor Bonser lived and taught."

A Major Contribution

Although Dr. Bonser's contribution to the evolution of industrial arts as we know it today was not that of a technical practitioner of shopwork or drawing, it was nonetheless pervasive and determinative. Born and brought up on a farm, under conditions that must have been of a more or less pioneering type, he necessarily learned how to do many things with his hands. This background is assurance of his comprehension of the significance of the hand in all phases of human life.

His early preoccupation with the problems of experimental psychology, his acquaintance with the philosophy of John Dewey, and his own independent studies of child growth and development, prepared him for a new approach to the studies of the curriculum of the elementary school which he pursued in the training schools at Cheney and at Macomb. He recognized the need and the place for industrial arts in the school, and he proceeded to do something about it.

The significant part of Dr. Bonser's work came during that difficult transition period when manual training was struggling to free itself from its cocoon of formal discipline, and its more or less wooden concept of its mission, and to emerge into a wider horizon of industrial arts inspired by a new psychology and by modern discoveries in the growth and development of child life.

It is not surprising that progress was delayed by critics who cherished a fundamental dislike for learning to do new things in new ways, as well as by those for whom thinking is an inconvenient, not to say painful, experience.

The chief reason, however, for what seemed at the time the slow rate of progress in accepting the new point of view was the lack of adequately prepared teachers of industrial arts. The most fruitful period of Dr. Bonser's career was, as we have seen, from 1910 to 1931. It should be remembered that the first college or university department for the preparation of teachers of industrial arts was organized in the 1890's. Other similar departments were added very slowly, until a period of more rapid development occurred during the 10 or 12 years beginning soon after 1900. It was not until 1904 that Professor Richards voiced the first public appeal to change the name, "manual training," to "industrial arts."

The term "manual training" was in common use in 1910, when Dr. Bonser went to Teachers College, as professor of education. (It is still used, in 1947, in some sections of the United States.) Within a comparatively few years, as historical periods go, "industrial arts" became the accepted term more and more generally. In a matter such as this, of accepted custom or usage, it is impossible to fix a definite date. It would be helpful to make an extensive search through the files of educational journals, proceedings of educational associations, and other sources, to note changes in administrative positions, titles of papers and addresses, and other events important enough to be chronicled. This I have not been able to do, although I can give two examples of what I have in mind. The institution now known as Kansas State Teachers College was officially named the Kansas State Manual Training Normal School as late as 1923. To offset this, this institution erected a building in 1912, to house shops and drafting rooms, and called it Industrial Arts Building.

Another bit of evidence to show how difficult it is to fix a date for the general acceptance of the new term is found in the following statement by William E. Roberts, published in a Bulletin of the United States Bureau of Education as late as 1924:[2]

"It is utterly hopeless to expect to bring order out of the confusion of terms that designate hand activities in the schools or to expect the universal adoption of any term or group of terms that may be presented.

"The term 'manual arts' is chosen to designate the work presented in this report. 'It is the historic term,' and defines and limits more clearly the work with which we are concerned; it is more definite than practical arts, which includes household arts and agriculture; it is less restricted than mechanic arts; it avoids the possible confusion of industrial arts with industrial art and industrial education and training. The term 'manual training' has in recent years fallen into such disuse that it is doubtful if it will in the future be recognized in educational work."

Whether it required ten years in some parts of the United States, or two decades or three in some other parts, certain it is that Dr. Bonser was influential in changing manual training, as a more or less limited, mechanical, manipulative, "doing" activity, into industrial arts, a "content subject" in the curriculum, and a method of teaching and learning. In one sense, this was not a personal achievement. As already pointed out, Dr. Bonser was not a shop teacher. The change-over required a generation or more of skilled teachers and supervisors of shopwork and drafting, who were capable of comprehending the vision and of translating it into reality.

Credit for the movement that led to the adoption and popularization of the new term industrial arts was shared by a number of leaders in the more technical phases of manual training as well as by leaders in the fields of educational philosophy, psychology, and administration. Of the former, some of the outstanding figures were Charles R. Richards, subject of a previous sketch in this series; Charles A. Bennett, Bradley Polytechnic Institute, Peoria, Ill., and founder of the *Industrial Education Magazine;* Robert W. Selvidge, University of Missouri; Frank M. Leavitt, University of Chicago, and associate superintendent of schools, Pittsburgh, Pa.; Clyde A. Bowman, The Stout Institute, Menomonie, Wis.; and Joseph C. Park, State Normal School, Oswego, N. Y.

Of the latter class of molders of opinion, representing educational philosophy, psychology, and administration, some of the more influential were Dean James E. Russell, Teachers College, who collaborated directly with Dr. Bonser; Lorenzo D. Harvey, The Stout Institute, Menomonie, Wis.; Henry Turner Bailey, *School Arts Magazine;* and David Snedden, Teachers College, New York. Of this latter group of administrators and philosophers (including others not named), it is probably no exaggeration to say that Dr. Bonser's influence was as decisive as that of all the others combined. This was, in part, because he had a nationwide audience, and his entire professional career was spent in teacher-training institutions, in which he had the opportunity to inspire successive waves of teachers and administrators with his own evolving conceptions and ideals of education. It is true that some others possessed these same qualifications, but Dr. Bonser's case was unique in one respect.

A Significant Definition

If any one factor more than another was responsible for the extent and the quality of Dr. Bonser's influence on the trend of events, it was undoubtedly the crystallization of his ideas into a popular "definition" of industrial arts. The definition was happily worded, and stirred the imagination of those who were capable of comprehending its implications. With the accompanying interpretation it also created the impression of being based upon sound reasoning and thorough knowledge of the child and of the school.

The statement of the definition most often quoted is that which appeared in 1923,[3] although the concept was actually reduced to definite form at a much earlier date. I remember hearing the point of view, if not this precise definition, discussed in class when I was a graduate student at Columbia University in 1912–14. Reduced to its lowest terms, it reads:

"The industrial arts are those occupations by which changes are made in the forms of materials to increase their values for human usage. As a subject for educative purposes, industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes."

This definition was more widely and authoritatively quoted than any other in the history of the movement. It met with the approval of many prominent leaders in industrial arts, and through them and their associates it circulated extensively and speedily. It made a strong appeal to public school administrators because of its emphasis on "content," and because of the implied contribution to and support of other subjects in the curriculum. More important still, it stimulated industrial-arts teachers everywhere to examine their stated objectives, their courses, and their methods, to determine how their work compared with that contemplated by the new vision of what industrial arts might become.

[2] William E. Roberts: *Manual Arts in the Junior High School,* Bulletin, 1924, Number 11, p. 2, United States Bureau of Education, Government Printing Office, Washington, D. C., 89 pp.

[3] Bonser and Mossman, *Industrial Arts for Elementary Schools,* p. 5 (New York: Macmillan, 1923), 491 pp.

(To be continued)

Vocational Education and Society

THOMAS DIAMOND
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(Continued from page 370 of the November, 1947, issue)

Annual Report

The superintendent must prepare a report to his board covering the various activities carried on in the school system during the current year. The accuracy and completeness of this report depends upon the extent to which the superintendent is informed concerning what has been transpiring in the numerous departments or divisions of the school system.

While the director may have been keeping the superintendent informed as events occurred during the year it is good practice to submit to him an annual report covering the significant information pertaining to vocational education. It may be that the superintendent has not asked for such a report. There is always the possibility, too, that he may not use it when he gets it. However, regardless of this, the director should consider this as one of the musts in his list of duties.

Such a report is valuable for the following reasons:

1. It causes the director to take inventory of the achievements of his department and to evaluate them properly.
2. If his report is to be complete and accurate it compels the director to keep adequate records of what is transpiring.
3. It assures the director that the superintendent is informed about the department.
4. It makes it possible for the superintendent to talk intelligently, on the basis of knowledge, on matters related to the department.
5. It provides the superintendent with live material for his annual report.
6. It tends to increase the standing of the director in the eyes of the superintendent.

It is unlikely that any two reports would be the same since each report varies with the conditions existing. However, in general, the following items might receive some consideration.

A. *Statistical*

1. In most cases a superintendent must present to his board statistics covering attendance, size of classes, materials used, cost per student, etc.
2. It is probable, too, that he should have these figures divided into day classes, evening classes, trade classes, industrial-arts classes, shop classes, or related subject classes. This information is especially necessary if reports must be made to secure federal or state reimbursement.
3. Comparison between the current year and former years shows the growth or lessening of particular types of work.
4. He should be supplied with definite figures on the amount of commercial work done in the department and on the saving in money to the board.

B. *General*

1. The superintendent should have drawn to his attention any new types of work introduced, any extensive expansion, or any elimination of work.
2. He will be interested in any progress the director believes the department has made.
3. He should have brought to his attention any plans the director may have for the future.

When classes are conducted under the provisions of the Smith-Hughes or George-Deen Acts and the superintendent wishes to make application for reimbursement there is certain evidence which he must present in order to justify his claim. When the director is preparing his annual report it will be part of his responsibility to include such information as will enable the superintendent to fill out the required application forms. The following information is suggested as being appropriate for this purpose. It has been copied from the official forms used in the state of Michigan and is presented here merely to illustrate the type of information that the superintendent may have to provide in other states.

C. *Annual Report on All-Day Trade Classes*

1. Each unit trade taught should be listed with the total enrollment divided into male and female students.
2. The type of subject matter covered in each class must be listed. Is it shopwork or related subjects?
3. The number of clock hours per week spent in each class must be indicated.
4. The enrollment in each class must be listed showing the number of male and female students.
5. The name of the teacher of each class must be listed and the amount of his salary paid him for each class.

D. *Annual Report on Part-Time Trade Classes*

1. The name and location of the school in which class is held;
2. Indicate whether classes are general continuation, trade extension, trade preparatory, or co-operative;
3. The enrollment — male and female, indicate also apprentices;
4. List subjects taught with the name of the teacher in each case;
5. Hours of instruction per week received by pupils;
6. Number of weeks school was conducted;
7. Amount paid to the teacher per subject or class.

E. *Annual Report on Evening Trade Class*

1. The information required concerning evening classes is similar to that required for part-time classes except item B. In this case the subject being taught shall be listed in place of the type of part-time class.

F. *Annual Report on Apprentices*

1. The name of each apprentice must be listed;
2. Indicate whether or not each apprentice is on an approved program;
3. The occupation of each apprentice;
4. The time spent by each apprentice during the year divided into hours employed and hours in school;
5. All apprentices dropped or who have completed their apprenticeship during the year must be indicated.

While the director may not have official forms on which to report this information it will be helpful if he includes it in his report in a form convenient for the superintendent to copy. The importance of having this type of information in the report, and of having it, complete and accurate in every detail, cannot be too strongly emphasized.

The superintendent's report to the state department is based upon the information he receives. The report of the state to the federal office of education depends upon the superintendent's report. The federal office will refuse to reimburse the state for its expenditure until the information is received and the local superintendent cannot hope to receive either state or federal money until the state has collected its

allotment from Washington. From this should be clear that, in so far as federally subsidized classes are concerned, the director's report is necssary and important.

The following table headings are presented here as indications of what a director might consider to be important. It is not suggested that all of these should be used. It is hoped, too, that the director will think of others. The main thought is that each director should decide upon the information he hopes to pass on to the superintendent; he should be active in collecting the information during the year, and he should have a specific method of presenting it which makes for easy interpretation by those to whom the report is made.

Various Report Blanks

COMPARATIVE COSTS IN DIFFERENT DEPARTMENTS

Dept.	*Average enrollment*	*Average No. class hrs. per week*	*Cost for year*			*Cost per pupil per hour*
			Equipment	*Supplies*	*Total*	

JOBS DONE IN DEPARTMENT

Dept.	*Job*	*Ordered by*	*Value of material used*	*Cost of labor at 25c an hr.*	*Saving to the board of education*
Printing	1000 form No. 100	Supt.			
Auto	Grind valves	Principal of junior high			
Wood	Stage scenery	Principal of senior high			

ANALYSIS OF WORK AND EXPENDITURES BY DEPARTMENTS

	Departments					
	Mech. Draw.	*Electricity*	*Print.*	*Machine shop*	*Sheet metal*	*Woodwork*
Cost for salaries						
No. of pupils						
No. of classes						
Average pupils per class						
Average salaries of teachers						
No. of recitations per week						
(per teacher)						
Cost of materials (total)						
Cost of materials per pupil						

ENROLLMENT IN THE GENERAL CONTINUATION CLASSES

Year	*1st Term*		*2nd Term*		*Total*
	Boys	*Girls*	*Boys*	*Girls*	
1941–42					

COMPARATIVE ENROLLMENT IN EVENING CLASSES

Class	*1941–42*		*1942–43*	
	1st Term	*2nd Term*	*1st Term*	*2nd Term*
Airplane mechanics				
Auto mechanics				
Drafting electricity				
Etc.				

Looking the World Over

This photograph won first prize in Class 4 (animals and pets) in the 1947 National High School Photographic Award contest. It was submitted by Donald Bowman, student of San Benito County High School, Hollister, Calif.

DETROIT PUBLIC LIBRARY

Teaching Materials for Industrial Education

CHRIS. H. GRONEMAN
Head, Industrial Education Department
Agricultural and Mechanical College of Texas
College Station, Tex.

(Continued from page 381 of the November, 1947, issue)

BULLETINS AND BOOKLETS

Handcraft (Continued)

Spool Cotton Co., 745 Fifth Ave., New York 22, N. Y.
ABC of Knitting
ABC of Crochet
ABC of Embroidery
It's Sew Easy
Stitch in Time Saves Nine
Stitch in Time
Fashion Parade
Thread and Needle Chart
Reference List of Available Material on Clothing and Grooming
Current Pattern Books covering various phases of sewing, etc. — 10 cents each

Tanner's Council of America, 100 Gold St., New York 7, N. Y.
Romance of Leather — 5 cents
Dictionary of Leather Terminology — 4th *Edition* — 15 cents

Thayer and Chandler
1948 Catalog

Tubbs Cordage Co., 200 Bush St., San Francisco 4, Calif.
Knots and Their Uses

X-Acto Crescent Products Co. Inc., 440 Fourth Ave., New York 16, N. Y.
Building Your First Flying Models — 25 cents
Paper Sculpture — 25 cents
Whittling Is Easy with X-Acto — 25 cents
How to Build Scale Model War Planes — 15 cents
The Boat Whittler's X-Acto Handbook — 10 cents

Industrial and General

American Bottlers of Carbonated Beverages, 1128 — 16th St., Washington 6, D. C.
The Manufacture of Bottled Carbonated Beverages

American Brass Co., Waterbury 88, Conn.
How to Protect Your Home Against Rust
Anaconda Copper & Copper Alloys
Anaconda Pipe Copper Tubes and Fittings

American Chicle Co., Thomson Ave., at Manly St., Long Island City, N. Y.
Facts About Chewing Gum

American Crayon Co., P.O. Box 581, Sandusky, Ohio
(See listing of booklets and bulletins, etc., under Handcraft Division)

American Gas Association, 420 Lexington Ave., New York 17, N. Y.
The Story of Gas — 2 cents

American Glassware Association, 19 West 44th St., New York 18, N. Y.
The History of Glass

American Potash Institute, 1155 — 16th St. N.W., Washington 6, D. C.
Wartime Contribution of the American Potash Industry
The Salt That Nearly Lost a War
Better Crops with Plant Foods (Magazine) — 10 cents per issue

American Society of Agricultural Engineers, St. Joseph, Mich.
Agricultural Engineering as a Professional Career

American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y.
Catalog of publications on various phases of mechanical engineering

American Sugar Refining Co., 120 Wall St., New York 5, N. Y.
The Story of Cane Sugar

American Technical Society, 850 East 58th St., Chicago 37, Ill.
Book Catalog
Technical Training
Upgrading Instruction

American Thread Co., 260 West Broadway, New York 13, N. Y.
The Story of Cotton Thread
Star Picture Patterns, Instructions Included, of crocheted and knitted items made up for beginners — 72 cents doz.
Star Instruction Books in Crocheting, Knitting, and Tatting — 64 cents doz.

American Viscose Corp., 350 Fifth Ave., New York 1, N. Y.
Short Course in Rayon
Rayon Care Clinic
Rayon Wardrobe Portfolio
Rayon Glossary (No. 212) — 10 cents per copy when ordered in quantity
Vinyon (No. 309)

Anthracite Institute, 101 Park Ave., New York 17, N. Y.
The Story of Anthracite
Natural Advantages of Anthracite
Anthracites and Semianthracites in the United States
The Story of "Blue Coal"
Mining and Preparation of Anthracite
The Wonders of Anthracite

Association of American Soap & Glycerine Producers, Inc., 295 Madison Ave., New York, N. Y.
Nothing Takes the Place of Glycerine

Bausch & Lomb Optical Co., Rochester 2, N. Y.
Use and Care of the Microscope (D-118)
Milestones in Optical History (L-17)
B & L Honorary Science Award and Science Scholarships
Lens Coating (F-18)
Color Correction (F-134)
What Lens to Choose (F-125)
Photographic Optics (F-20)
Bubbles in Lenses (F-135)
The Educational Focus (magazine)

Beech-Nut Packing Co., Canajoharie, N. Y.
The Story of Beech-Nut Strained Foods and Junior Foods
My Visit to a Coffee Plantation in Columbia
Professor Finds Chewing Habit Aids Efficiency
The Story of Chewing Gum
A Trip Through the Beech-Nut Peanut Butter Plant
The Beech-Nut Idea, and the Story of Its Growth
The Star Spangled Banner, a Brief History

Bell & Howell, 7100 McCormick Road, Chicago 45, Ill.
Architects' Visual Equipment Handbook
Movies Go To Work
Learning Unlimited
Teaching Eternal Truths

Botany Mills, Inc., Passaic, N. J.
A Wool Primer: The History and Uses of Nature's Noblest Fiber
Your Woolens: Their Wear and Care

Breuer Electric Manufacturing Co., 5100 N. Ravenswood Ave., Chicago 40, Ill.
Circulars describing Tornado vacuum cleaners, electric blowers, etchers, and dust collectors and floor machines

Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y.
Solvent Recovery by the Columbia Activated Carbon System
Ethylene for Coloring Matured Fruits and Vegetables
The Physical Properties of Synthetic Organic Chemicals

Cluett, Peabody & Co. Inc., 10 East 40th St., New York 16, N. Y.
The Story of Cotton
The Biography of An Arrow Tie
The What, When and Wear of Men's Clothing

Consumers Union of U. S., Inc., 17 Union Square West, New York 3, N. Y.
Consumer Reports — 35 cents
(These *Reports* are 48 pages, and contain the results of tests and examinations of consumer goods and services. Published monthly for the benefit of the consumer.)

Corn Industries Research Foundation, 3 E. 45th St., New York 17, N. Y.
Corn in Industry
Corn Facts and Figures
Tapping the Treasure in Corn
Corn — a quarterly bulletin

Corning Glass Works, Corning, N. Y.
A Short Story of Technical Glass Ware
Biography of Joseph Priestley
Biography of Antoine Lavoisier
Biography of John Dalton
Biography of Louis Pasteur
Biography of Sir Henry Cavendish
Evolution of Standard Taper Ground Joints (order on school letterhead)
Laboratory Glass Blowing with Pyrex Brand Glasses (order on school letterhead)

Darco Corporation, 60 East 42nd St., New York 17, N. Y.
Activated Carbon

Disston and Sons, Inc., Henry, Philadelphia 35, Pa.
Disston Saw, Tool & File Manual
Disston Pruning Guide

Electric Storage Battery Co., Allegheny Ave. and 19th St., Philadelphia 32, Pa.
The Storage Battery: Its Fundamentals, Use and Maintenance

Glycerine Producers' Association, 11 West 42nd St., New York, N. Y.
Glycerine Facts
Nothing Takes the Place of Glycerine

Gypsum Association, 330 S. Wells St., Chicago 6, Ill.
The ABC's of Plastering
Gypsum — A Mon-Metallic Mineral
Brief on Gypsum Plaster

Hammer Laboratories, 624 Monaco Blvd., Denver 7, Colo.
Set of five phosphorescent paints — $1. postpaid
Set of five fluorescent paints — $1 postpaid (Each color in these sets of ready-mixed paint will cover about 8 square inches — 2 coats)
Card with inch-square plaques showing each of the 10 colors above — 25 cents (This can be used to demonstrate phosphorescence and fluorescence to a large group.)
Catalog of the Hammer Laboratories with 4 square inches of green phosphorescent cloth — 10 cents. (Lists electroscopes, spinthariscopes, radium paints, ultraviolet, argon and neon lamps, etc.)

Hammett Company, J. L., Kendall Square, Cambridge, Mass.
General Catalog — school supplies
Special Catalog — Occupational Therapy and Handicraft Items

Hershey Chocolate Co., Hershey, Pa.
The Story of Chocolate and Cocoa
Fuel Value of Foods

Inland Steel Co., 38 South Dearborn St., Chicago 3, Ill.
How Steel Is Made

International Salt Co. Inc., Scranton, Pa.
Rock Salt for Eliminating Track Heaves and Shimming (No. 331)
Rock Salt to Prevent Freezing of Coal (No. 336)
Rock Salt for Elimination of Weed Growths (No. 427)
Rock Salt in Preparation and Care of Tennis Courts (No. 378)
Rock Salt for Frost Damage Prevention on Highways (No. 337)
Rock Salt for Ice Removal on Streets and Highways (No. 343)
Rock Salt for Base and Surface Stabilization (No. 376)

International Textbook Co., Scranton 9, Pa.
School Catalog
College Catalog
General Catalog

Iowa State College, Ames, Iowa
Index to 2500 Books on Industrial Arts Education and Vocational Industrial Education, 1820–1934 — 80 cents
Objectives of Industrial Arts Education — 80 cents
Poems for Teachers of Industrial Arts Education — 80 cents
Text Questions in Industrial Arts Education — 80 cents
An Index of Shop Kinks — 80 cents
Research Problems and Methods in Industrial Arts Education — 65 cents

Iron Fireman Mfg. Co., 3795 West 106th St., Cleveland 11, Ohio
The Story of Fire

Kewanee Boiler Corp., Kewanee, Ill.
Kewanee Firebox Boiler
Fireboz Boiler Operators
Operation and Care of Firebox Boilers
Kewanee Residence Steel Boiler
Kewanee Boiler Stoker-Fired
Kewanee Round "R" Steel Boilers
Kewanee Steel Firebox Boilers
Kewanee Steel Boiler Type C Smokeless
Kewanee Steel Riveted Boiler

Lyon Metal Products, Inc., Aurora, Ill.
General Catalog, Lyon Steel Equipment

Manual Arts Press, Peoria 3, Ill.
Catalog of texts, references, projects, and professional books

Minneapolis-Honeywell Regulator Co., Minneapolis 8, Minn.
Personalized Apartment House Control
"Comfort Unlimited"
Radiant Control of Panel Heating — $1.

Morton Salt Co., 310 South Michigan Ave., Chicago 4, Ill.
The History of Salt

National Association of Manufacturers, 14 West 49th St., New York 20, N. Y.
The Public Be Served
Faith
Competitive Enterprise vs. Planned Economy
The American Triangle of Plenty
Present Economic Conditions (single copies)
Financing Small Business — Its Economic and Financial Requirements (single copies)
NAM Looks at Cartels (single copies)
The Citizen's Stake in the Labor-Union Problem
Americans Won't Stand for Monopolies
Collective Bargaining — A Management Guide (single copies)
How Much Government Can You Afford?
Now — Let's Build America
A Challenge to Industry (single copies)
Co-operative Education and Other Work-Study Plans (single copies)
Education — It's Your Business
Preparing for Industrial Work
Jobs and the Woman
Trends in Education — Industry Co-operation (periodical)
Program Notes for Women's Clubs (monthly newsletter)
Farm and Industry (periodical)

National Child Labor Committee, 419 Fourth Ave., New York 16, N. Y.
The National Child Labor Committee
Child Labor — In the First Year After the War
The Case for Sixteen Year Employment Laws
Margin for Living — The 40 Hour Week
The State Legislative Council — A Medium for Social Action
Child Labor — Social Work Year Book 1945
Analysis of Child Labor Law — Any State
Standards Recommended for the Employment of Children
Your Newsboys
Has Work Experience a Place in Secondary Education? (Reprint from *High School Journal*, Nov.–Dec., 1946)
Child Labor Facts — 10 cents
Look Before You Leap — 10 cents
Work Experience in Secondary Education: A Study of Part-Time School and Work Programs — $1
The Long Road, Fortieth Anniversary Report — $1
Children in the Theatre — 50 cents
Bibliography on Migratory Agricultural Labor — 10 cents
Cotton or School — 25 cents

National Fire Protection Association, 10 Batterymarch St., Boston 10, Mass.
The Story of the National Fire Protection Association
Assortment of booklets on fire prevention — 10 cents each

National Geographic Society, Washington 6, D. C.
Weekly Periodical — The Geographic School Bulletins — 25 cents per school year

National Peanut Council, Inc., 812 Citizens & Southern National Bank Bldg., Atlanta 3, Ga.
The Snack Jar Plan
The Powerful Peanut
The Peanut Industry at the Crossroads

National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.
Price List and brief description of National Safety Council materials, publications, and supplies
1945 Edition Bibliography Industrial Safety and Health — 35 cents
List of Industrial Data Sheets
Index to Safety Instruction Cards
Index of Safe Practices and Health Practices, pamphlets — free to members; 75 cents to nonmembers
Industrial Safety Guide — 75 cents to members; $1.50 to nonmembers

Safety Education in the School Shop — 50 cents
School and College Membership Services

New York Times, Times Square, New York City
A Study of the Newspaper — 10 cents
News: The Story of How it is Gathered and Printed — 10 cents

Owens-Corning Fiberglas Corp., 718 Fifth Ave., New York 19, N. Y.
Fiberglas — An Engineering Material (single copies)

Palmgren Products, Chicago Tool and Engineering Co., 8383 South Chicago Ave., Chicago 17, Ill.
Palmgren Vises, Milling Attachments
Electrode Holders, Weld Gauges, Rapid Cable Connectors, Underwater Arc-Oxygen Cutting Equipment and Aircraft Propeller Servicing Equipment
Palmgren Rotary Table (circular No. 10)
Palmgren Angle Vises (circular No. 351)
Palmgren Milling Attachment (circular No. 12)
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Palmgren Electrode Holders (circular No. 345)
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Pepperell Manufacturing Co., 160 State St., Boston 2, Mass.
Selective Sales Promotion Material for Retail Store Personnel
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Pequot Mills, Empire State Bldg., New York 1, N. Y.
The Story of Pequot for Grade School Teachers (with samples of raw cotton and finished sheeting)
Sheet Manual for Home Economics Teachers

Philadelphia Quartz Co., 121 South 3rd St., Philadelphia, Pa.
Liquid Glass and Solid Solutions

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.
Color Dynamics for Buildings
Color Dynamics for the Home
Pittsburgh Color Dynamics — The Scientific Utilization of the Energy in Color to Promote Efficiency in Industry

Planters Nut and Chocolate Co., Wilkes-Barre, Pa.
What Do You Know About Peanuts?

Plymouth Cordage Co., P.O. North Plymouth, Mass.
Useful Knots and How to Tie Them
Lift It Safely
Rope on the Farm

Porter Chemical Co., Pennsylvania & Prospect Ave., Hagerstown, Md.
The Wonders of Chemistry
The Chemcraft Science Club Hand Book & Catalog
The Chemcraft News

Procter and Gamble Co., Cincinnati 1, Ohio
The Story of Soap

Pyrene Manufacturing Co., 560 Belmont Ave., Newark 8, N. J.
What You Should Know About Fire Extinguishers

Schroeder and Tremayne, Inc., 1711 Delmar Blvd., St. Louis 3, Mo.
The Story of Sponges and the Story of Chamois

Sheldon and Co., E. H., Muskegon, Mich.
General Catalog of Vocational Equipment

Smooth-On Manufacturing Co., Jersey City 4, N. J.
Catalog of Smooth-On Uses

Socony-Vacuum Oil Co., 26 Broadway, New York 4, N. Y.
Pamphlets on Petroleum and the Petroleum Industry

South Bend Lathe Works, South Bend 22, Ind.
The Hand
If I Were 21[3]
Keep Your Lathe Clean
Oiling the Lathe
The Installation and Leveling of the Lathe
How to Run a Lathe[3] — 25 cents[4]
The South Bend Machine Shop Course[3] — 50 cents
Modern School Shops
Catalog No. 100-D
How to Grind Cutter Bits — 10 cents
How to Cut Screw Threads — 10 cents

Standard Oil Co., 30 Rockefeller Plaza, New York 20, N. Y.
Blockbusters from Oil
Mighty Molecule of the Air War
The Future of Industrial Research
Industrial Research and National Defense
Summary of Forum on Future of Industrial Research
Petroleum in the World
Insecticides
Conservation
Pictorial Map of the Americas
Rubber from Oil

Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.
Industrial Tachometer, Form No. 18-12 CC — 6 cents
Portable Hand Tachometer, Form No. 18-12 DD — 2 cents

Strathmore Paper Co., West Springfield, Mass.
Making Expressive Strathmore Papers

Texas Gulf Sulphur Co., Second National Bank Bldg., Houston 2, Tex.
The Use of Sulphur in Control of Truck Crop and Cane Fruit Insects and Diseases
The Sulphur Content of Foods
The Use of Sulphur in Soils
Rose Diseases
Sulphur in Poultry Production
Sulphur in Live Stock Production
Chigger Control
Saving Beans from Rust
The Use of Sulphur for the Control of Certain Diseases of Ornamental Plants in Texas
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Series of Safety Posters

Problems and Projects

ALUMINUM CALENDAR STAND

DOUGLAS B. HOBBS
Aluminum Company of America
Pittsburgh, Pa.

BILL OF MATERIAL

A. 1 piece, 14 B&S gauge (0.064 in.) by 3⅞ by 5¾ in., 52S–H34 flat sheet

B. 1 piece, 14 B&S gauge (0.064 in.) by ⅜ by 2⅞ in., 52S–H34 flat sheet

C. 1 piece, 14 B&S gauge (0.064 in.) by 2 1/16 by 4 in., 52S–H34 flat sheet

3 1/16-in. diameter by 3/16 in., 2S flathead rivets

2 No. 2–56 by ½ in., steel roundhead machine screws and nuts

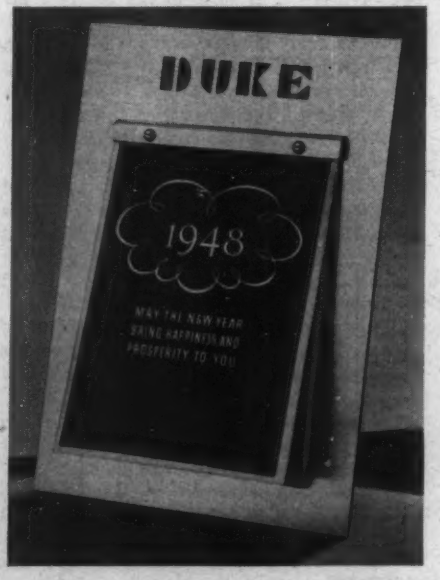


Fig. 1. Aluminum calendar stand

The aluminum calendar stand shown in Figure 1 may be considered an elementary project designed to acquaint the junior high school student with basic metalworking processes.[1] The dimensions given in the working drawings are for a calendar, 2⅞ by 4 in. This is a three-month calendar with the center month on each sheet being the current month. Since calendars of the same size as illustrated may not be available in all stores, the calendar should be purchased before making the stand. Changes in the dimensions of the calendar stand may then be necessary to fit the new calendar.

The calendar stand is made from 14 B&S gauge (0.064 in.) Alcoa 52S-H34 (former designation, 52S-½H) alloy sheet. Before cutting sections *A*, *B*, and *C*, the sheet should be covered with masking tape or paper to prevent marring during the fabricating operations. Use a pyroxylin adhesive to apply the paper. Saw to within 1/32 in. of the dimension lines and file to the dimension lines with a single-cut file. The scroll saw should have more teeth per inch than the gauge number of the sheet. In this case, more than 14 teeth per inch.

To personalize the calendar stand, the name

[1]Other projects of an elementary nature recently described in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION by the same author include: "Aluminum Barrette, Bandeau, and Bracelet," February, 1947; "Aluminum Coasters," October, 1947.

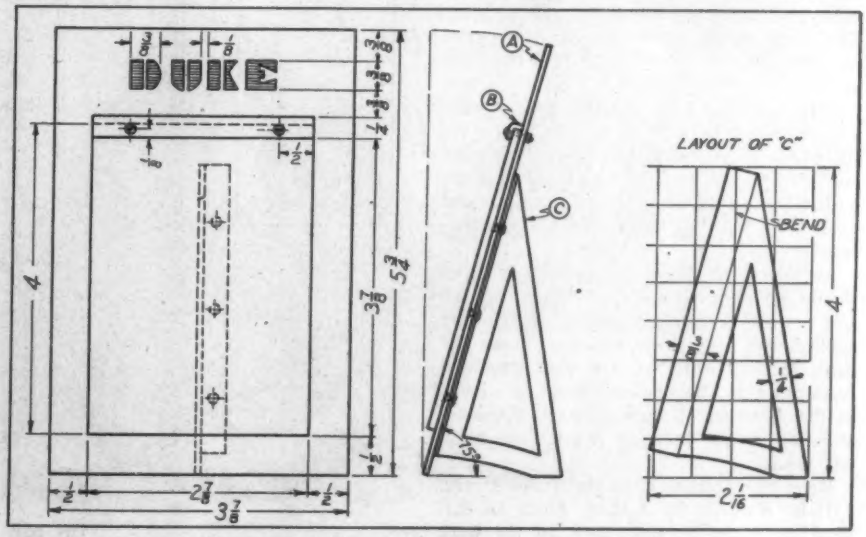


Fig. 2. Details of aluminum calendar stand

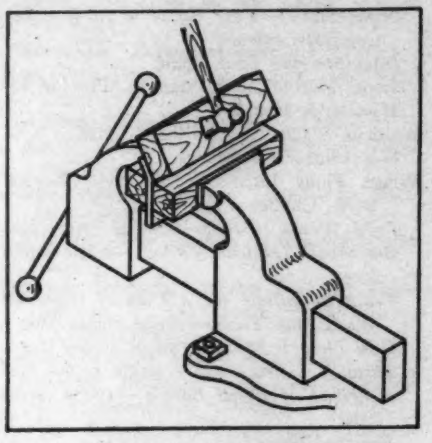


Fig. 3. Method of forming the bracket and clip

or initials of the school should be cut in the front *A*. This can be done with a narrow scroll saw blade (0.016 in. thick, 0.054 in. wide) after which the cut should be filed smooth with needle files.

The bracket *C* and the calendar clip *B*, after being sawed and filed, should be bent in a vise. Even though the sections are covered with masking tape or paper, it is well to have the jaws of the vise covered with soft aluminum or lead sheet to prevent the teeth in the jaws from biting into the metal. If the vise jaws are not as wide as the bracket and clips are long, use the setup shown in Figure 3. The bend line should be marked in pencil, never with a metal scriber as it might scratch through the paper covering and into the sheet, causing it to crack in bending. Now put the bracket into the vise with the bend line at the top of the vise jaws and with the ⅜-in. portion, which will be riveted to section *A*, extending above the vise jaws. Do not strike the bracket directly with a hammer or mallet, as this will give an uneven bend. Place a block of softwood, as long or longer than the bracket, against the metal and strike the wood with the hammer. The bend should be 90 degrees, not under or over. Bend the calendar clip *B* in the same manner.

Attach the bracket *C* to the front *A* with a clamp, and drill three 1/16-in. holes for the rivets. Countersink the holes on the front side of the front section. Attach the calendar and clip *B* to the front *A* with a clamp and drill two 3/32-in. holes for the machine screws.

At this point the masking tape or paper should be removed from all three sections. Use acetone to take off paper that has been applied with a pyroxylin adhesive. Finish the three sections with No. 3/0 steel wool and furniture wax. The sections should be rubbed in the direction of their greatest dimension and *only* in that direction. A soft satin finish will result.

Rivet the bracket *C* to the front *A* with 1/16-in. diameter by 3/16-in. Alcoa 2S flathead rivets. In riveting, back up the work with a smooth flat metal surface to prevent marring the preformed heads. Strike the rivet shank with a few heavy blows of the hammer rather than a large number of light blows. Light blows tend to peen over the rivet shank without upsetting it in the rivet hole. The hammered head of the rivet should fill the countersunk hole. If it extends above it, remove the excess metal with a file and fine emery cloth so that the hammered head will be flush with the face of the sheet. Dress with No. 3/0 steel wool and furniture wax.

Attach the calendar and clip *B* to the front *A* with No. 2–56 by ½-in. steel roundhead machine screws. The slots in the machine screws should end up in the direction of the length of the clip. Again dress up any defects with the steel wool and furniture wax. Illustrations:

1. Aluminum calendar stand
2. Details of aluminum calendar stand
3. Method of bending sheet longer than the width of the vise jaw

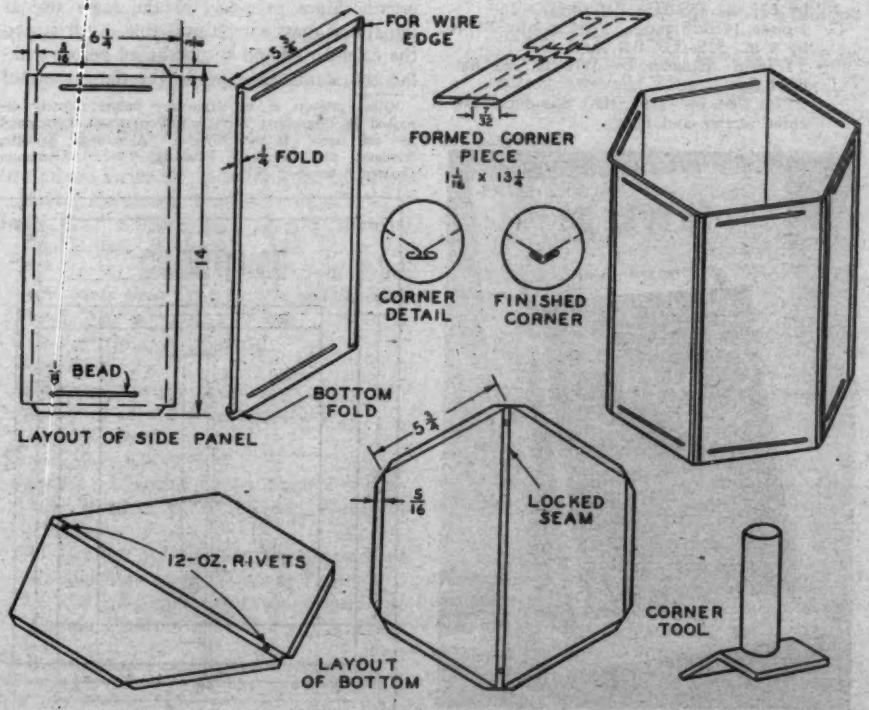
TIN CAN WASTEBASKET

JAMES McCULLOUGH
Student,
DELBERT A. DYKE
Associate Professor of Industrial Arts
Middle Tennessee State College
Murfreesboro, Tenn.

Industrial-arts teachers are recognizing the need for training in quantity production methods. Projects to be made by this method require planning of a higher order than is required for individual projects. The student also learns to perform an operation correctly the first time and obtains some degree of skill because of the necessary repetition. Knowledge of supervision and inspection procedure is also gained.

Unfortunately for the shop teacher, suitable production projects are not easily found. Obtaining materials has been a problem, as well as profitable disposition of the articles, without offering unfair competition to school patrons. Middle Tennessee State College has

The tin can wastebasket



Tin can wastebasket

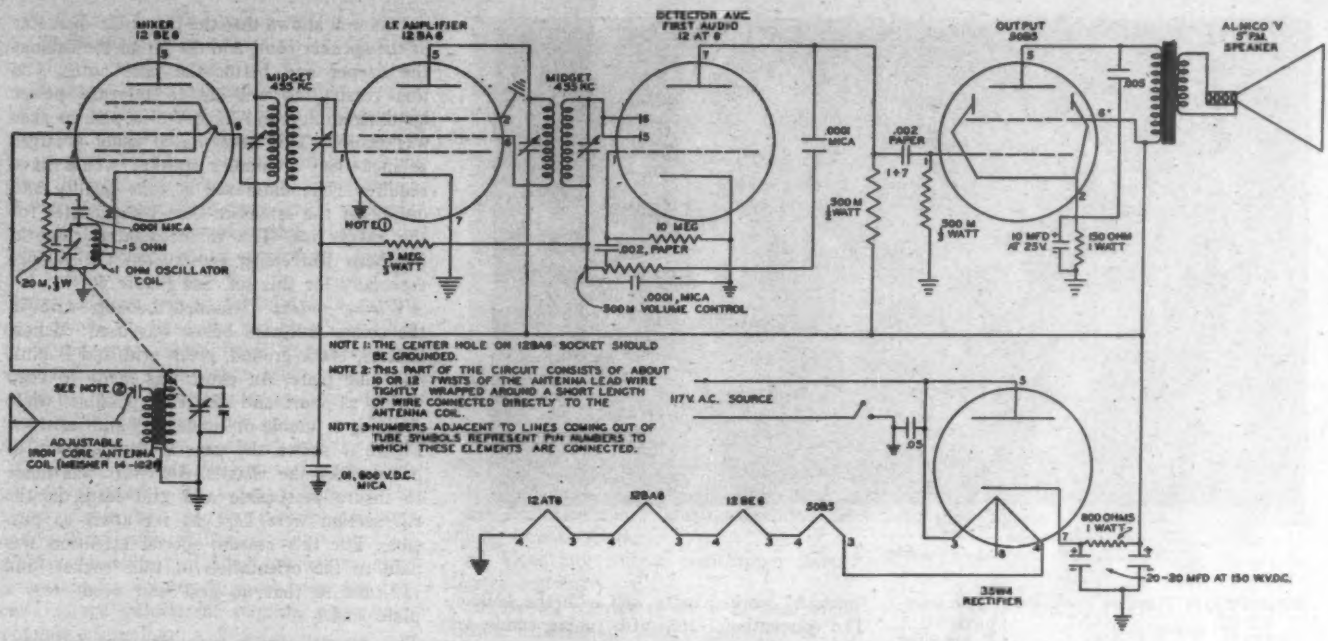

MIXER 12 BE 6
MIDGET 455 KC
1ST AMPLIFIER 12 BA 6
MIDGET 455 KC
DETECTOR AVC FIRST AUDIO 12 AT 6
OUTPUT 50B5
ALNICO V 5" PM SPEAKER
.0001 MICA
+5 OHM
1 OHM OSCILLATOR COIL
20 M, ½ W
NOTE 1
3 MEG. ½ WATT
10 MEG
.002, PAPER
.0001, MICA
500 M VOLUME CONTROL
.0001 MICA
.002 PAPER
300 M ½ WATT
500 M ½ WATT
10 MFD 25 V
150 OHM 1 WATT
.005
NOTE 1: THE CENTER HOLE ON 12BA6 SOCKET SHOULD BE GROUNDED.
NOTE 2: THIS PART OF THE CIRCUIT CONSISTS OF ABOUT 10 OR 12 TWISTS OF THE ANTENNA LEAD WIRE TIGHTLY WRAPPED AROUND A SHORT LENGTH OF WIRE CONNECTED DIRECTLY TO THE ANTENNA COIL.
NOTE 3: NUMBERS ADJACENT TO LINES COMING OUT OF TUBE SYMBOLS REPRESENT PIN NUMBERS TO WHICH THESE ELEMENTS ARE CONNECTED.
SEE NOTE 2
ADJUSTABLE IRON CORE ANTENNA COIL (MEISNER 14-1024)
.01, 600 V.D.C. MICA
117 V. A.C. SOURCE
.05
12AT6
12BA6
12BE6
50B5
35W4 RECTIFIER
800 OHMS 1 WATT
20-20 MFD AT 150 W.V.D.C.

Fig. 1. Diagram of a.c.–d.c. superheterodyne using 150 ma. miniature tubes

overcome at least some of these problems and now has a class where production line methods are used.

An assembly line in the sheet-metal department is designed to manufacture wastebaskets for the students themselves, and for the dormitories of the college. The baskets are made from No. 10 cans, discarded by the school cafeteria. Students are assigned different positions each class period, thereby learning the entire process from cutting the cans into strips, to painting and stenciling on room numbers.

First, the discarded cans are cut open and the sides flattened. Then they go to the squaring shears where the rims are removed, and the material cut to size for the side panels. Then by means of templates, the metal is scribed, and the corner pieces cut out. At the bar folder the sides are bent for a slip joint on the corners. A seat for a wire edge is made on the top of each panel and a fold to house the bottom is placed on the opposite end.

The wire for the top is bent around a hardwood jig. The bottom is made from two sections fastened together by a lock seam and two rivets. The corner pieces for the slip joint are cut to size and formed on the bar folder.

All of the prepared stock is then passed on to a bench where two students quickly assemble a hexagon shaped can, 13 in. high and 10 in. across the short diameter.

The corners are locked by a special tool consisting of a short length of angle iron welded on a piece of rod.

Then comes the final inspection for any dents incurred in the assembly. The paper from wrappers is removed on the wire brushing wheel. A coat of enamel is sprayed on, and when dry, the stenciling of the room numbers completes the basket.

FIVE TUBE A.C.–D.C. SUPERHETERODYNE RECEIVER USING 150 MA. MINIATURE TUBES

J. LAWSON MURRY
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Southern University
Baton Rouge, La.

A major problem in the design of compact radio sets has been the physical dimensions of the components, including even the smallest popular GT tube types. The new miniature tubes recently released by RCA and other manufacturers offer possibilities toward a solution to this problem. Five of the tubes designed as miniature equivalents of the popular tube types used in a.c.–d.c. receivers were used in a construction project by three advanced radio students in this institution. These miniature tubes have a maximum height above chassis of 1⅞ in. and a maximum diameter of ¾ in. Their voltage and current characteristics are the same as in their standard size equivalents.

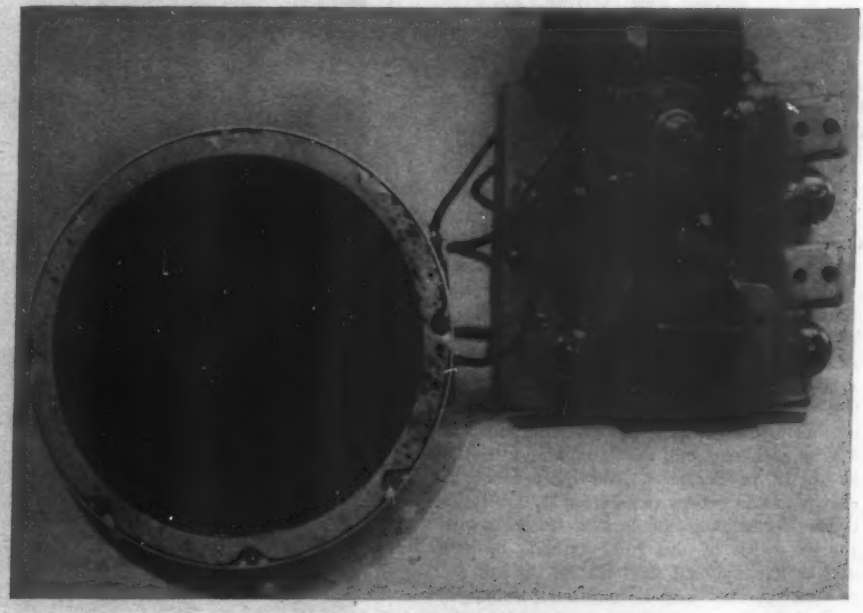

Fig. 2

Fig. 3

Miniature type	*Standard equivalent*	*Application*
12BE6	12SA7	Converter
12BA6	12SK7	I.F. Amplifier
12AT6	12SQ7	Detector, 1st Audio,A.V.C.
50B5	50L6	Output
35W4	35Z5	Rectifier

Because of the very high mutual conductance of the 12BA6 the sensitivity of the sets including these tubes is far superior to that of sets of similar construction using standard tubes. In these sets, this tube seemed very stable with one unusual precaution necessary.

That is, the center metal ring and the tube base requires grounding. In comparative checks made with a signal generator and signal tracing analyzer the 12AT6 showed slightly higher gain than did the 12SQ7. No appreciable difference in performance was noted in the other tubes. Two of the sets used the midget I.F. transformers that are found on many popular battery portables, such as those employing the 1R5, 1S4, 1S5, 1T4. The other set used the standard small size I.F. transformer. No noticeable difference in the performance of sets, using different I.F. transformers, was noted.

Building the Set

In this project, three sets were made. Only one is described in this article. Two of the sets were constructed on chassis bought already prepared with four socket holes for miniature battery tubes. Here it was necessary to add another socket hole for the rectifier and mount the output transformer on the speaker instead of in the holes punched on the chassis. For the set pictured and described in this article the chassis was cut down to 4¼ in. each way, and the parts were mounted as shown in Figure 2. The components as shown in the schematic, Figure 1, are quite conventioned as is the general hookup, with the exception of the 50B5 cathode by-pass which increased gain somewhat at the expense of quality. This may be omitted for inverse feed back, if desired. The standard three connection oscillator coil, designed for use with the 6SA7 worked quite well with the 12BE6. The conventional 365 mfd. tuning condenser without plates for the oscillator section was used. Two variations from this schematic appeared in sets not pictured with this article. One used a loop instead of the antenna coil. In the other variations A2 section filter resistors of 200 ohms and 2000 ohms each were used. In this case voltage for the output plate was taken from the junction of the two resistors and other B voltages were taken from the end of the 2000 ohm section. This resulted in greater hum-free operation for this set.

It is well known that the larger the diameter of the speaker cone, and the larger the cabinet the deeper and better the bass notes. For this reason, as well as to increase power handling ability, an Alnico V 5-in. p.m. speaker was chosen. This necessitated using a larger cabinet than a smaller speaker would have required. The difference in tone quality and output of the set more than compensates for the extra size. The cabinetmaking class in Southern University constructed the cabinet especially for this set. See Figure 3.

Wiring notes: Stranded hookup wire in the colors indicated below was used: Yellow heaters, black ground, green grid, red B plus, and blue plate. An effort was made to keep wiring as short and direct as possible, while avoiding a jumble of condensers and resistors. Figure 4 shows the general arrangement of parts under the chassis. An effort was made to insure that plate and grid leads in the r.f. section were kept as far apart as possible. For this reason, special attention was paid to the orientation of tube sockets and i.f. cans so that no grid lead need cross a plate lead.

This general wiring procedure was followed:

1. Connect all i.f. transformers leads to proper pins avoiding crossing plate and grid wires.
2. Wire in heaters, switch, and line cord, test by seeing that tubes all light.
3. Wire in filter circuit and connect all B-plus points. Test for 85-120 volts d.c. with volt meter.
4. Ground all other ground points.
5. Wire all grid circuits.
6. Connect speaker, check for hum.

Fig. 4

7. Connect loop or antenna coil.

Check off all connections on the diagram as soon as they are made.

Students were constantly reminded that good soldering means much in set performance. All joints were checked and rechecked to see that they were bright in color and not piled up with the solder. Among other things, the students seemed to come to an appreciation of the value of thoroughly heating the joint. The technique of controlling direction and extent of solder flow by tipping the chassis slightly was quite helpful in making neat joints. In this case the chassis is tilted to insure that solder flows *down into* the lugs and holes rather than piles upon them.

By use of a signal tracing analyzer the set was tested for oscillation at the oscillator section of the tuning condenser, and the signal was traced through the set and each stage properly aligned to its correct frequency. The signal used in each case was a signal generator and a local radio station at 1400 kc. Only slight readjustment of trimmers was required for maximum volume, in most cases the correct factory adjustment requires only small amounts of tuning.

Check List for Trouble Shooting

Instructions were issued that trimmer adjustments should be the last resort. The following check list was given students that they might find other possible sources of trouble prior to *play with the trimmers.*

1. Are there any loose wires in the set? .....

2. Are all points on all tubes connected? .....

3. Are all points connected according to the diagram? .....

4. Have all tubes been checked for shorts? .....

5. Have all tubes been checked for quality? .....

6. Have both gangs of tuning condenser been checked for shorts? .....

7. Are all tubes in the proper place? .....

8. Is there plus voltage on these pins?

12BE6, pin 5 .....
12BA6, pin 5 .....
12BA6, pin 6 .....
12AT6, pin 7 .....
50B5, pin 6 .....
50B5, pin 5 .....

9. Are all cathodes properly grounded? .....

10. Have all condensers been tested for shorts? ..... opens? ..... leakages? .....

11. Do all coils and transformers have continuity in each winding? .....

12. Does any coil or transformer have a shorted winding? .....

13. Do all restrictors show an ohm meter reading within the indicated tolerance? .....

14. Are all tube prongs actually making contact with the metal socket plug? .....

15. Does the speaker voice coil have an approximately correct ohmage? .....

16. Is there any resistance between each end of the volume control and the center contact? .....

17. Have you tried a substitute on the oscillator tube? .....

By following these suggestions, it is believed that compact receivers of high quality and volume of reproduction can be turned out by average students and experimenters.

Resistors:			
1	800 Ohm	1 Watt	Filter resistor
1	150 Ohm	1 Watt	50B5 Cathode by-pass
2	500M Ohm	½ Watt	50B5 Grid leak, 12AT6 plate load
1	10 Meg	½ Watt	12AT6 Grid leak
1	3 Meg	½ Watt	A.V.C. delay resistor
1	20M Ohm	½ Watt	Oscillator grid leak
1	500M	Volume control with switch	
Condensers:			
1	.05	At 400 V D.C.	35W4 Plate by-pass
1	20–20	At 150 V.D.C.	Filter condenser
1	10	At 25 V.D.C.	50B5 Cathode by-pass
1	.005	At 400 V.D.C.	50B5 Plate by-pass
2	.002	At 400 V.D.C.	Audio coupling
3	.0001	Mica	I.F. filter, I.F. by-pass, Oscillator coupling
1	.01	600 V.D.C. or mica	A.V.C. by-pass
1	Dual section	Variable condenser	R.F., oscillator tuning
Transformers:			
1	Meisner	No. 14–1026 or equal	Antenna coil
1	Meisner	No. 14–1033 or equal	Oscillator coil
2	Midget	455 Kc.	I.F. transformers
1	Output	Transformer	2500 Ohms Pri. Impedance
Tubes:			
1	12BA6	Mixer	1–50B5 Output
1	12BA6	I.F.	
1	12AT6	Detector, A.V.C. 1st Audio	1–35W4 Rectifier
Miscellaneous:			
1	AlnicoV	5-in. p.m. speaker	
5	Amphenol	Miniature tube sockets	
1	A.C. line cord with plug		
2	4 Point bakelite terminal strips		
1	Chassis cut to 4¼ x 4¼ assorted hardware — nuts, screws grounding lugs		

MINIATURE SLEIGH

ERNEST J. RAWSON

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Northern Montana College
Havre, Mont.

During the holiday season the need often arises for decorative and festive arrangements for table settings or mantels. Many of these can be made out of scrap materials by the students during class time.

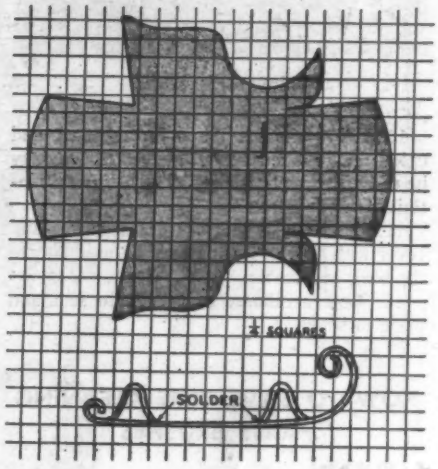


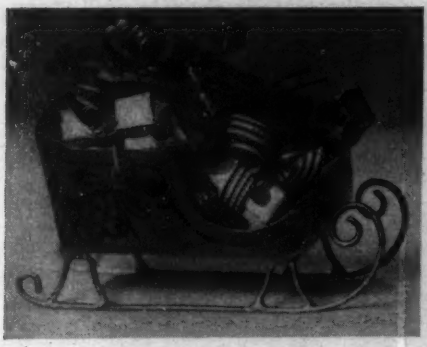
Fig. 1. Template of miniature sleigh

The miniature sleigh, illustrated herewith, is an example of one of these decorative pieces and makes a simple tin-can project that appeals to junior high and frequently to senior high students.

The design, size, and shape of the sleigh can be changed to meet specific needs. The design on the sleigh can be painted freehand, stenciled, or Christmas seals can be cut out and pasted on the sides. Several students chose to wrap small pieces of wood into miniature packages using colorful Christmas wrappings and placing in the sleigh while others chose to place a miniature of Santa Claus on the velvet cushion. Versatile students may even wish to carve reindeer in addition to making the sleigh.

Suggested Procedure

1. Make a drawing paper template (see Fig. 1).
2. Cut bottom from tin can. Then cut along vertical seam of can, and flatten out sheet.
3. Place template on tin and scribe outline of sleigh on metal.
4. Cut out sleigh.
5. Place sleigh over wooden block the size of the bottom and bend sides and ends downward.
6. Solder corners.
7. Form the runners out of number 12 galvanized wire and solder as indicated on the drawing.
8. Solder the runners to the bottom of sleigh.
9. Finish the sleigh with one coat of aluminum paint and apply decoration.



Miniature sleigh

10. Cut a wooden block for the seat and upholster with red velvet. Velvet ribbon may be used for smaller sleighs. The color and material is optional.

11. Cut back of seat out of cardboard and cover with velvet. Cotton may be used to pad the back and seat.

12. Tack cardboard seat back to seat and place in sleigh.

HOW TO SAVE TIME CLEANING PAINT BRUSHES

E. KURATH

Chemical Science Dept.
West Division High School
Milwaukee, Wis.

There are thousands of dollars' worth of paint brushes which can be reclaimed and put back into service with relatively little effort.

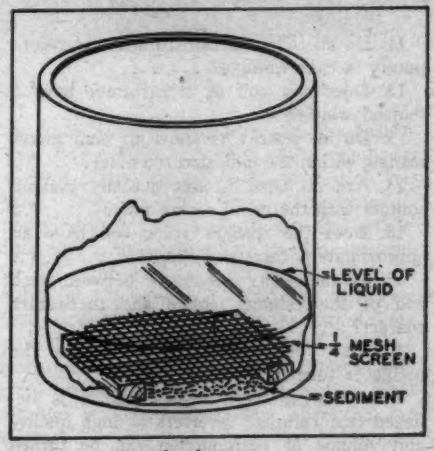
Practically all school shops have some brushes which have hardened and are useless. Other brushes have their efficiency reduced because paint has built up and hardened in the heel of the brush. Then there are the brushes which (in painters' language) are lousy, having specks of hardened paint throughout the bristle to mar the finish being applied.

All types of brushes can be put back into service by using and applying a few basic principles. Paint or enamel protects because they produce a protective film when they dry. This protective film also holds the pigments and other insoluble materials in a hard brush. By dissolving this binder in the paint, varnish, enamel, or lacquer, the materials in the hard brush are released from the bristle and by using a suitable solvent these materials can be washed out in the convenient brush washing bath, shown in the accompanying illustration.

The most satisfactory method for dissolving and softening this binder is one that is employed in the vapor type brush conditioner, a recently developed process. In this process the brushes are hung into an airtight container where they are exposed to the action of volatile paint and lacquer solvents. Such vapors have a very potent dissolving action on the binder of the material in the brush, whether it be linseed oil, tung oil, or a natural or synthetic resin.

In a comparatively short time (1 to 5 days), depending on the size of the brush and the nature of the material it contains, the brush will have been thoroughly softened and is ready to be washed out.

Then use a clean paint can (half gallon or gallon) with a tight fitting friction cover in which you have placed a coarse screen (about ¼-in. mesh), about 1½ to 2 in. off the bottom of the can. Use the same mixture of solvents supplied with the vapor type brush conditioner so that the solvent covers the screen to a depth of about one inch. Work the brush on this screen. The pigment will settle to the bottom. The screen prevents the brush from touching the sediment. If the friction cover is kept tightly closed when not in use this solvent can be used many times before it is necessary to replace it.



Brush cleaning can

When hardened paint choked brushes are being reclaimed the handle of the brush should first be freed of the softened paint or varnish. This can be done with a knife. The paint will also peel off the metal ferrule and excess paint can be removed from the bristle. The brush is then ready for the bath where the binder and pigments will be washed out. Brushes which have been hard for years can be brought back to full service.

One should not overlook the fact that the hard brush has been preserved perfectly by the hardened paint around it, just as the paint preserves the wood on which it is used. Some of the brushes which you can reclaim today are often of better quality than the brushes you purchase.

Brushes which appear to be lousy after washing in the brush bath should be treated as follows: stroke out the brush on a paper until nearly dry. Then dry the brush with a cloth. When the brush has become perfectly dry, the small particles in the brush will fly out as you rub the palm of your hand across the end of the bristle.

Since the solvent used in the brush bath is really a paint solvent the binder which usually holds these particles in the brush has been removed by the solvent. Therefore, the specks of material are free to leave the brush.

After brushes have been put back into use they should be stored in an airtight container, preferably the vapor action type which prevents paint from hardening in the heel of the brush. By following these suggestions, much time can be saved by the instructor and his students.

The brush bath will also be useful when changing from one color to another.

TREATING CHRISTMAS TREES TO REDUCE FIRE HAZARD

TECHNICAL NOTE NO. 250

Forest Products Laboratory
Madison, Wis.

The U. S. Forest Products Laboratory has concluded that keeping the tree standing in water is about the most practical, satisfactory, and convenient method for reducing the fire hazard and preventing the needles from discoloring or falling. Additional protection against fire can be provided by the use of fire-retardant coatings in conjunction with the water treatment if the retention of the natural color of the foliage is unimportant.

Recommended Treatment

The procedure recommended for the water treatment is as follows:

1. Obtain a tree that has been cut as recently as possible.

2. Cut off the end of the trunk diagonally at least 1 inch above the original cut end. Stand the tree at once in a container of water and keep the water level above the cut surface during the entire time that the tree is in the house. If the tree is not to be set up for several days, it should be kept standing in water meanwhile in a cool place.

If started in time, this treatment not only will prevent the needles from drying out and becoming flammable, but it will also keep them fresh and green. It will, in addition, retard the fall of needles of such species as spruce, which loses needles very easily, in contrast to balsam fir, which retains its needles even after the branches have become dry and the needles brittle. Freshly cut spruce or balsam fir trees standing in water cannot be set on fire by candle or match fires, but, of course, will not withstand a large source of heat.

Decorative Coatings

Several types of fire-retardant coatings that either prevent or greatly retard flame spread when applied to wood will provide similar protection when applied to Christmas trees.

For those willing to undertake the extra trouble and expense in the use of decorative coatings, the following simple formulations are suggested:

FORMULA I

(Produces a shiny transparent colorless coating.)

Ingredient	*Parts by volume*
Sodium silicate (water glass)	9
Water, containing a wetting agent, such as Dreft, Vel, or Breeze (about 1 teaspoon per quart)	1

FORMULA II

(Produces a cream-colored coating. May be tinted with suitable dyes.)

Ingredient	*Parts by weight*
Sodium silicate (water glass)	31
China clay	41
Water, containing wetting agent (about 1 teaspoon per quart)	28

FORMULA III

(Produces a glossy white coating. May be tinted with suitable dyes.)

Ingredient	*Parts by weight*
White lead (basic carbonate)	41.0
Borax	32.0
Raw linseed oil	22.8
Turpentine	3.6
Japan drier	.6

This type of coating can be made at home by mixing equal parts of a commercial white lead paint and of a borax-linseed oil paste. The paste is prepared by stirring together one part by weight of boiled linseed oil and 2 parts of borax ground and sieved to remove coarse lumps.

In applying any of the foregoing coatings the fact must be kept in mind that a heavy coating is necessary to reduce the fire hazard. Two coats are recommended. The coatings may be applied either by dipping or by spray. It may be necessary to thin formula I for spray application in which event more applications are necessary.

Silver effects can be had by spraying an aluminum paint on trees coated with either formula II or III.

If a coating is applied, it is recommended that the water treatment also be used to insure the added protection against fire that the moisture in the tree provides. Furthermore, experiments have shown that the water treatment improves the adherence of brittle coatings, such as formulas I and II, because the moisture-filled needles do not shrink and thus allow brittle coatings to flake off.

INDIAN SILVERSMITHING

BEN HUNT

Hales Corners, Wis.

(*Continued from page 384 of the November, 1947, issue*)

Ear Ornaments

The ear ornaments described herewith are fine one-evening jobs which are really excellent for the beginner who needs practice in soldering. They also possess the advantage that when something goes wrong, little time and material has been wasted, and the scrap metal can always be melted and used again.

By soldering these small parts, the beginner will acquire the feel for proper heating which will stand him in good stead when he starts soldering larger pieces, or when he has to join small pieces to those of larger size.

Four new stamps also are shown. These will be found useful in making projects such as the ear ornaments described.

Plate 3, on page 80 in the February, 1947, issue shows how stamps are made. The two stamps shown at the right-hand bottom corner

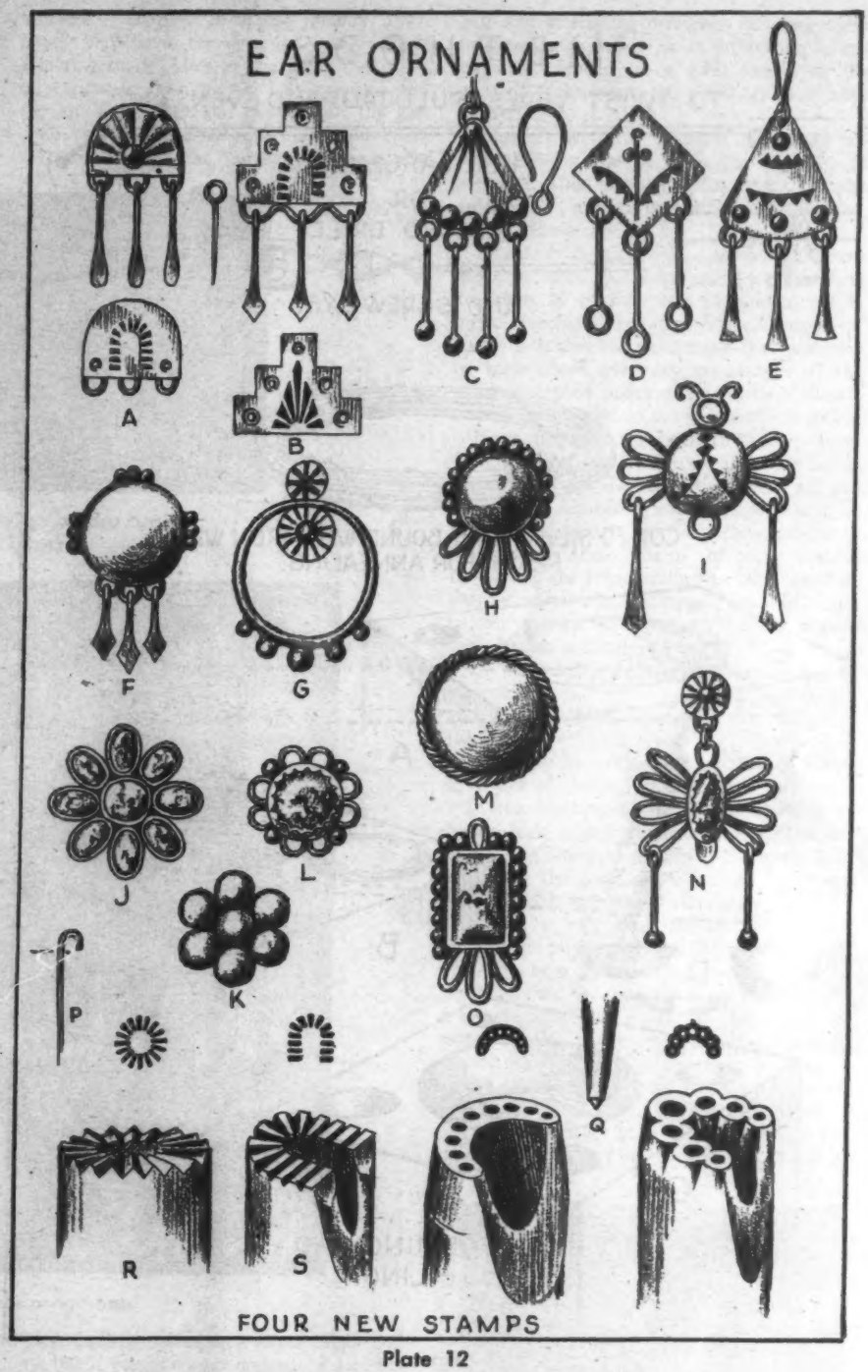


Plate 12

in Plate 12, are rather interesting. At *Q* is shown the punch used to make the little round holes. The point of the punch should be reground to a somewhat sharper angle than that used on a center punch.

The stamps were made of drill rod, shaped roughly and then punched with the reground punch. Locate the place for each hole with a light punch mark, and then hammer a little harder until the holes are as they should be. The punch will push up the metal around the holes. These elevations are then filed off carefully until an even surface is again obtained. Then it will probably be necessary to hammer a little more after which the smooth surface must again be produced with a file. Stamp *R* is made by drilling out the center, after which the radial cuts are made with a file.

In Plate 12, at *A* and *B* are shown different stampings on the same shaped background.

All of the ornaments, *A*, *B*, *C*, *D*, and *E*, are made according to the same general plan; that is, a flat piece of silver with wire spangles. These can all be made of scrap pieces of

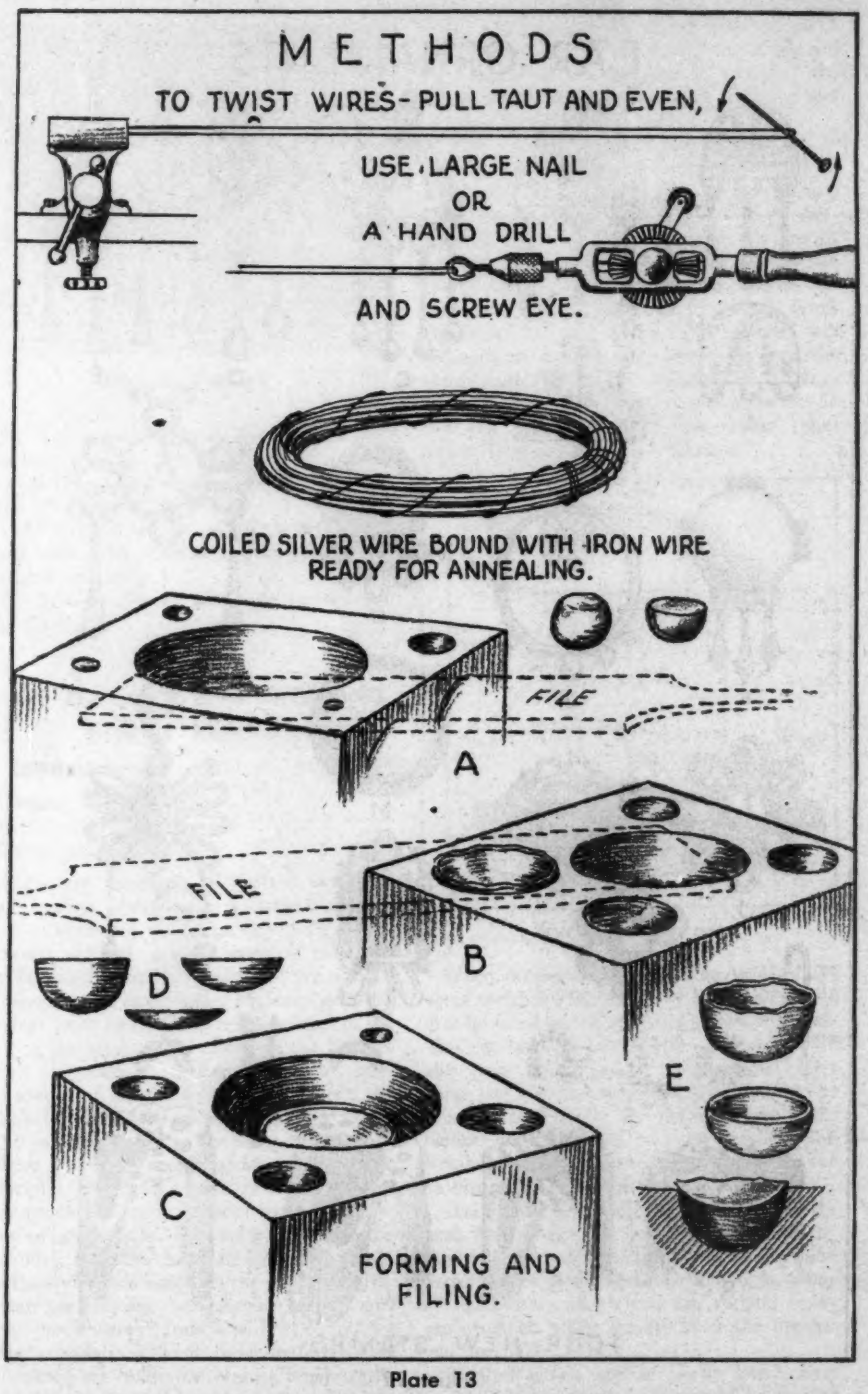


Plate 13

20-gauge silver. Mark the shape on the silver with a pencil and stamp the design on it before cutting out, as shown in Figure 1. This is done because when stamping small pieces of silver, the metal has a tendency to spread, but if the piece is a little larger that trouble is avoided. Some may prefer to saw out the pieces to the outline, but it is faster to cut almost to the inner corners with a small tin snips and then break off the pieces. A few strokes of a file will then dress up the blank. After that it should be turned face down, on a smooth anvil or block of wood, and hammered level. Twenty gauge wire was used wherever wire is shown. The wire loops are bent first as shown at *P*, Plate 12, and then cut off. All loops should be filed to fit snugly against the main piece. In the upper ornament at *B*, Plate 12, is shown another way of making the loops. In some of the ornaments *raindrops* are shown. When making these raindrops, even if exactly the same amount of silver is used, there will be some variation in size. To make them more alike, place them in one of the small depressions in the dapping die, with the flat side up, as shown at *A*, Plate 13. Then tap them down into the depression, and run a file over the flattened part. This will make all the raindrops more uniform, and they will also set firmly on whatever they are to be soldered.

In soldering small articles, especially when many parts are soldered at one time, it may be found that one or two may not work out right. In that case, put a drop of flux right on the metal without cooling it off first. Then put another little snippet of solder over the joint, and heat those parts over again, and they will be soldered perfectly.

The ornament at *G*, in Plate 12, has nine places to be soldered. This can all be done in one operation. In fact, two of these ornaments may be soldered at one time, by having them on the charcoal block, side by side. As soon as one is soldered move the flame over and in a short time the second one will be finished, too. The disk on the inside of the wire ring in ornament *G* is stamped out with stamp *R*, after which a raindrop is soldered in the center of it. The raindrops at the bottom should be set up against the ring with a small snippet of solder where they touch.

The wire spangles come last. The ends are flattened down, shaped, and then the wire is cut off the long piece. Each spangle is 7/8 in. long before the eye is bent. After bending the eye, open it again, put it in place, and then close it.

The spherical parts used for ornaments *F*, *H*, *I*, *K*, and *M*, Plate 12, are hammered out on a dapping die. See Figures *B*, *C*, *D*, and *E*, Plate 13. All have backs soldered to them after they are shaped and filed. Figure *B*, Plate 13, shows how to file the edges of these little half spheres by setting them in a dapping block depression. The shallow parts of spheres can be made by using a larger depression as shown at *C*, Plate 13. Care should be taken in using the dapping block for filing, so as not to file the block itself.

At *J*, Plate 12, is shown a Zuni design with 8 turquoise stones. The bezels are soldered onto a flat piece of silver and the surplus metal cut away with a jeweler's saw and then filed. The same procedure is followed with *K*.

In making the *bug* ear ornament, shown at *I*, Plate 12, the stamping on the body is done before it is shaped in the dapping die. Then a back is soldered to the domed piece, and of course, the wings, head, feelers, and tail are soldered on in the next operation.

Figures *L*, *N*, and *O*, Plate 12, have turquoise as you will notice. The ear ornaments in Figure 2 were photographed before the clasps were soldered on, to make photographing a little more simple. The clasps can be purchased from handcrafts shops and in some department store notion departments. They can be had in silver or white metal. The pair shown in Figure 2 are of white metal. They can and usually are fastened to the body of the ornament with soft solder. That is, 50-50 tinner's solder, using the same flux and one or two small snippets of solder. Using soft solder eliminates the danger of the solder in the

earring melting, as the melting point of the silver solder is much higher. Indians usually have their ears pierced and use the simple hooks shown on the ornament at *E*, Plate 12.

Another thing which might be well to mention to beginners is in reference to soldering hollow domes to flat bases. With small domes everything works fine, but occasionally when soldering domes over 3/8 in. in diameter, the heat expands the air inside and prevents the solder from making a perfect joint along the edge. Then when the soldered piece is placed in the pickle, the acid is drawn into the hollow center and it is an awful job getting it out again. Be sure to have a perfect solder joint *all* around the domed pieces.

The Indian, when he has nothing smaller, uses his large plumber's blowtorch for all soldering, even for such small pieces as are used in making earrings. If you are using city gas and have a blowpipe such as is shown in Plate 1, on page 29 of the January, 1947, issue, you have no need to worry about soldering small pieces as the flame can easily be regulated, both by the gas pressure and the air blown into and mixed with the gas.

Of course, the Prestolite outfit shown on the same plate in the January issue, can also be used. Indians prefer their silver bright and shiny, but if you like your ornaments oxidized or tarnished and the high parts polished, you can easily satisfy your taste.

Fig. 1. Stamp the design before cutting out the blank

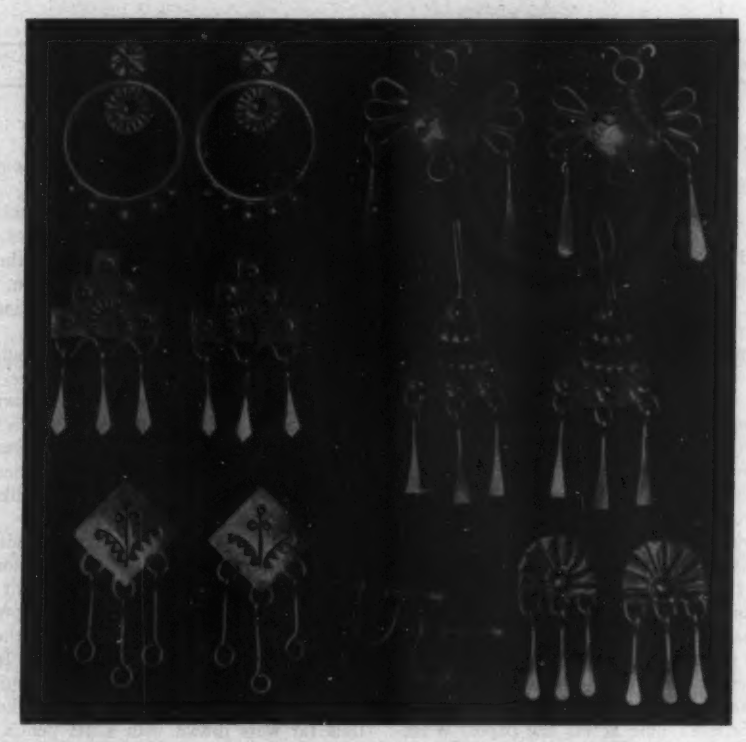


Fig. 2. Finished ear ornaments

TEACHING THE READING OF THE RULER

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Every new pupil entering upon the threshold of an industrial-arts experience anticipates new and interesting problems. Whether these problems turn out to be as interesting as anticipated, depends to a great extent on the number of problems the pupil brings in with himself.

One of the most common difficulties encountered by the pupil is the inability to measure. This inability often results in the anticipated problems becoming less interesting, if not, distasteful.

Especially is this true in a mechanical drawing experience. Some industrial-arts teachers are likely to consider this problem an arithmetic teacher's responsibility. Courses of study in arithmetic recommend that problems be taken from everyday experiences of the child. Accepted pedagogical practices dictate the use of experiences as the basis for learning.

No matter how fine a pattern of experiences the arithmetic teacher throws about the whole class, there will always be those who will unconsciously slip through unaffected. It may be that the experiences were not close enough to the interests and needs of the pupil. Instead of shifting the responsibility to other sources, the industrial-arts instructor, in subscribing to the principle of *learning by doing*, should regard it as a challenge.

Isn't an industrial-arts program a *natural* in providing experiences? It might also be advisable to work together with the arithmetic teacher in exchanging points of view and in co-operating by exchanging visual aids which have proved themselves effective.

In the teaching of mechanical drawing to junior high school students, the author has been using the device, shown in Figure 1, in explaining the parts of an inch to beginners. The one inch, cut into sixteenths, which slides freely, is a very desirable feature since it enables the pupil to realize that it is the unit, or as the boys put it, "the space between the marks," that is considered in marking off measurements. The nature of the device invites attention and encourages playful manipulation which ultimately results in learning.

The classroom teachers are free to borrow the device at any time. When the device is not in use by other teachers, it remains in the mechanical drawing room easily accessible to

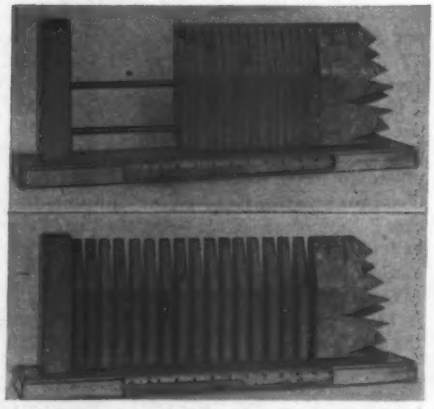

Fig. 1. An aid for teaching the use of the ruler

any pupil who wishes to satisfy his curiosity.

A satisfactory experience in mechanical drawing depends very largely on the understanding of linear measurements. With the beginners in drawing it is recommended that a demonstration of this device be followed by a drawing, such as is shown in Figure 1, which will enable the pupil to actually measure and record all the parts of an inch on paper. In a drawing of that kind the extent of detail should be controlled by the needs of the pupil.

The instruction sheet which follows is a suggested possibility. It has been used successfully in two different ways.

1. It may be given in its entirety to a faster pupil who can proceed with a minimum amount of individual instruction.

2. It may be used for group instruction where the teacher lifts item II (general information), and incorporates this related information into the demonstration of the device. The rest of the unit, as a separate form, is then handed to each member of the group. For the slower pupils it might be well to rewrite and simplify item III — procedure. In the execution of the plate the most difficult part is the rule with the sixteenth graduations. This need not be drawn in its entirety. The teacher should consider the ability, interest, and needs of the pupil.

INSTRUCTION SHEET NO. 1

Parts of an Inch

I. *Purpose*

To learn how to read a 12-in. ruler whose smallest graduation is 1/16 in.

II. *General Information*

Have you ever wondered what people who lived long before our times used in place of our present-day yardstick, ruler, tape measure, or the like.

History tells us that these people used the lengths of different parts of the body, such as the length of the fingernails, fingers, feet, arms, and so on, as units of measure. The first known measurement was called a *cubit*. It was the length of the forearm from the point of the elbow to the end of the middle finger; about 18 in. This cubit was subdivided into 2 spans (about 9 in. each); 6 palms (3 in. each); 24 digits (¾ in. each). The digit was the breadth of a finger or from .72 to .75 in. The palm was the width across an open hand measured at the base of the fingers.

Later on, two thirds of the cubit became the foot which was subdivided by the Greeks into 12 thumbnail breadths. The foot unit passed to Rome and so to Britain where its division of twelfths or "unicae" became "inches." Edward II in 1324 decreed that three barley corns taken from the center of the ear of corn be placed end to end to equal one in. A foot ranged from 9¾ in. to 19 in. Today it is 12 in. Henry I decreed the distance from the point of his nose to the end of his thumb was the lawful yard. We know it today as 36 in. In the sixteenth century, the length of the left foot of 16 men lined up as they left church on Sunday morning was the lawful rod. Today a rod is 16½ ft.

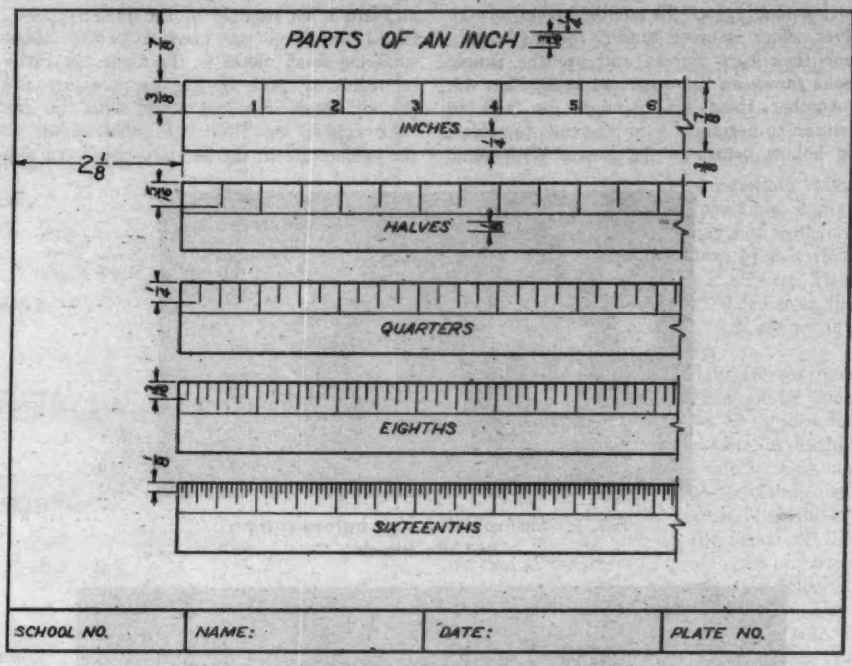

Fig. 2. The ruler as a drawing problem

Even in those days there was an apparent need for measurements. With time and through the inventive ingenuity of mankind, these rough sizes became our present-day standard units of length.

We all understand the importance of knowing and understanding units of measurement. This course in mechanical drawing offers many opportunities for developing a keener sense of judging distances, sizes, etc.

Hold your piece of paper in front of you at arm's length — How wide and how long is it? Now, check your guess by actually measuring the paper with your ruler.

III. *Procedure*

1. True-up and fasten a 9 by 12-in. piece of drawing paper on the board.

2. Draw border and index box as shown in Figure 2.

3. You will notice in Figure 2 that there are five separate sections of a ruler. Each section appears to have been broken off after the sixth inch. Let us begin by measuring down 7/8 in. from the top border line and drawing a very light horizontal line across the paper. Whenever you start a drawing, draw the lines lightly and usually longer than required. These lines are called construction lines, because they are the starting points for the rest of the drawing and are drawn lightly because you will find such lines are easier to erase.

4. After drawing this first horizontal line measure off on this line 2⅛ in. from the left border and draw a very light vertical line down to the bottom of the paper. This line will be the starting point for all five sections of the ruler.

5. Go back to the first horizontal line and measure down 7/8 in. and draw the second light horizontal line which begins at the vertical line and runs across the paper almost touching the right border line. This outlines the first ruler.

6. Now measure down ⅜ in. from this second horizontal line and draw the third horizontal line which is the beginning of the second ruler. All five 6-in. rulers are ⅞ in. wide, and there is a space of ⅜ in. separating one from the other.

7. When all five sections are outlined, return to the first section and measure down ⅛ in. from the first horizontal line drawn and draw another horizontal line very lightly. This line represents the bevel on the ruler. Examine your own 12-in. ruler and you will notice that the bevel makes the ruler look just like the one you are drawing.

8. Draw this same line on the other four sections. Return to the first 6-in. section and measure off the first inch. At this point draw a vertical line from the line which represents the top edge of the rule down to the line which shows the bevel of your rule. In like manner mark off and rule in the second inch, the third, fourth, fifth, and sixth. All the lines thus far were drawn with a 4H pencil. Now with your H pencil print the numbers: 1, 2, 3, 4, 5, 6 and also a jagged line about ¼ in. beyond the number six. This line is the kind that is used to represent breaks in wood. You see this ruler is shown as though it were broken off at this point.

9. Since this first section has only the inch graduations, draw light guide lines ⅛ in. apart for the word *inches*. You will notice that the lower guide line is placed ¼ in. from the lower line of this rule.

10. Line up your triangle with the one inch and draw a vertical line on each of the four other sections. Do the same for all the other inches.

11. Looking at your 12-in. rule you will

notice that the one inch marks are longer than the half, quarters, eighths, and sixteenths. We will do the same on our six-inch sections. The half-inch marks are 5/16 in. long. Draw these next on all but the first section, then mark off the ¼-in. lines which are ¼ in. long. Then the ⅛-in. marks which are 3/16 in. long and last, the 1/16-in. marks which are ⅛ in. long.

12. Letter in the words: halves, quarters, eighths, and sixteenths, in their respective sections.

13. Draw the jagged lines representing the breaks; and the title—**PARTS OF AN INCH**, as indicated. No dimensions are necessary on your plate.

14. Erase all construction lines and clean up your drawing. Go over all the lines, that are to remain, with your 4H pencil applying a little pressure in order to darken them up.

Neatness and accuracy are important. If you haven't already been too familiar with the graduations of a rule; the drawing of this plate should help you recognize the parts of an inch without any difficulty.

IV. *Questions*

Do you know the answers to the following questions?

1. How many 16ths are there in an inch?
2. 16ths in a half inch?
3. 16ths in a quarter inch?
4. 16ths in an eighth?
5. What is the best way of expressing: 4/8, 4/16, 2/4, 6/16, 6/8, 2/8?

AERONAUTICS

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(Continued from page 20A of the November, 1947, issue)

UNIT VI

Meteorology

Word list for the unit on meteorology:

1. meteorology
2. isobars
3. troposphere
4. stratosphere
5. ionosphere
6. tropopause
7. Boyle's law
8. Charles' law
9. absolute temperature
10. Gay-Lussac's law
11. temperature lapse rate
12. adiabat
13. stable air
14. unstable air
15. ceiling
16. relative humidity
17. specific humidity
18. polar air mass
19. tropical air mass
20. continental air mass
21. maritime air mass
22. waves
23. cold front
24. pressure gradient
25. cold dome
26. Buys-Ballot's law
27. cumilform clouds
28. rain cloud
29. cirrus stratus
30. alto stratus
31. stratus cumulus
32. cumulus nimbus
33. fog
34. isotherm
35. synopsis
36. general atmospheric lapse rate
37. adiabatic lapse rate
38. barometer
39. millibar
40. dyne
41. thermal currents
42. turbulence
43. vapor capacity
44. dew point
45. condensation
46. latent heat of condensation
47. vapor content
48. pseudo adiabatic process
49. pseudo adiabat
50. moist adiabat
51. dry adiabat
52. insolation
53. terrestrial radiation
54. polar air
55. tropical air
56. warm front
57. occlusion
58. wind shift line
59. low or cyclone
60. high
61. stratiform cloud
62. cirrus
63. cirro cumulus
64. alto cumulus
65. cumulus
66. nimbo stratus

I. The atmosphere and its composition

A. Observed air shadows up to six hundred miles above sea level (eclipse and northern lights). More than one half of the air by weight is below 18,000 ft.

B. Air has definite weight — 14.7 pounds per square inch.

C. The upper air is cold — minus 67 deg. F. at 36,000 ft. with little change over that height.

D. Troposphere extends about seven to eleven miles above the globe. All clouds, turbulence, and precipitation occur in it. Tropopause is the boundary between troposphere and the stratosphere.

E. Stratosphere has an approximately even temperature — a minus 67 deg. F., and has almost constant winds which blow in a westerly direction.

F. Composition of air

1. Nitrogen about 78 per cent; oxygen 21 per cent; and argon, water vapor, carbon dioxide, zenon, krypton, neon, and dust and spores the other 1 per cent.

II. Adiabatic lapse rate

A. Barometer. This instrument is used to measure air pressure in inches of mercury.

B. Millibars — a force of 1000 dynes per square centimeter. A dyne is a metric unit of measure. One inch of mercury pressure is equal to about 34 millibars.

C. Boyle's law states that the volume of a gas at a constant temperature is inversely proportional to the pressure.

D. Fahrenheit and centigrade thermometers.

$$F. = \frac{9}{5} C. + 32°$$

$$C. = \frac{5}{9} F. - 32°$$

E. Charles's law states that the pressure of a given quantity of gas, held at constant volume, is directly proportional to its absolute temperature. (For each 1 deg. C. decrease the pressure of the gas decreases $\frac{1}{273}$ of the 0 deg. C. pressure.) — 273 deg. C. is called 0 deg. A. (absolute temperature).

$$A. = C. + 273$$
$$C. = A. - 273$$

F. Gay-Lussac's law states that if a quantity of gas is held at constant pressure, its volume is directly proportional to the absolute temperature.

G. Properties of rising air

1. Expands
2. Becomes less dense
3. Cools as it expands

H. Adiabatic process

1. Any change in pressure, temperature, volume, and density which occurs without adding or subtracting heat is an adiabatic process.
2. Any temperature lapse rate (temperature decreases with changes in volume or pressure) in an adiabatic process is an adiabatic lapse rate. It is about 5½ deg. F. for each 1000 ft. of altitude.
3. On an adiabatic chart any line representing an adiabatic lapse rate is an adiabat.

I. Because of free circulation of the air the change in temperature of air in altitude should be the same as the adiabatic lapse rate (5½ deg. F.). But it is not. It is actually only 3 deg. F. for each 1000 ft. This lapse rate is called the general atmospheric lapse rate.

1. Air that has this average lapse rate, beginning at 59 deg. F. at sea level is called standard air.

$$\text{Density} = \frac{\text{Pressure}}{\text{Absolute temperature}}$$

III. Stable and unstable air

A. Stable air tends to stay put. It is more dense at the bottom and less dense in altitude.

B. Unstable air — when a relatively less dense mass of air starts to move through the mass of air or when the more dense air subsides through a mass of air.

1. Thermal currents are vertical columns of moving air.

2. Turbulence is caused by wind blowing over rough terrain.
3. Limits to turbulence are indicated on charts by an area from the atmospheric lapse rate to the adiabatic lapse rate.
4. Turbulence from thermal currents extend only to the moderate altitudes.

IV. Cloud formation and precipitation

A. Vapor capacity and vapor content
1. At a given temperature and pressure air can hold only so much water vapor. Higher altitude permits more water vapor due to less pressure.
2. The warmer the air the greater the water vapor capacity.

B. Air that contains all the water vapor it can hold is said to be saturated.

C. Condensation is the formation of dew. It is moisture that forms when cooling surrounding air reduces its vapor capacity to a point where the air becomes saturated.

D. Latent heat of condensation — as the air is cooled through lifting, the more condensation takes place, and the more heat of condensation can be noted. This heat is called latent heat of condensation.

E. Because the rate of cooling of air is slowed by liberation of the latent heat of condensation, the adiabatic lapse rate does not continue uniformly beyond the point where condensation occurs.

F. Pseudo-adiabatic process — the adiabatic process that is the course taken due to the latent heat of condensation causes a different process.

G. Moist adiabat — when all moisture is carried along by the air.

H. Dry adiabat is an adiabat without condensation.

I. Cloud formation takes place when moisture condenses in the rising air and remains suspended in it.

J. Ceiling is the base of a cloud layer.

K. The formation of clouds and rain — as the moisture reaches saturation point the vapor content is increased beyond the vapor capacity. The less dense air rises fast and takes along this moisture forming large thunderheads. As the air cools past the freezing point the ice crystals form and form nuclei for raindrops.

L. Relative and specific humidity
1. Relative humidity is the rate of water vapor capacity to water vapor content.
2. Specific humidity is the quantity of water vapor a body of air contains.

V. Air mass sources

A. Four sources of air masses:
1. Polar
2. Tropical
3. Maritime
4. Continental
5. Most air in the United States is tropical maritime or either polar continental or polar maritime.

B. Insolation is the heating of the earth's surface by the sun's rays.

C. Terrestrial radiation — every body, no matter how cold, radiates heat.

D. Polar air tends to be cold, stable, and dry, if formed over Canada. Polar air tends to be cold, stable, and relatively moist if formed over the north Pacific.

E. Tropical air formed over Africa is warm, relatively unstable, and dry. Tropical air formed over the Caribbean tends to be warm, relatively unstable, and relatively moist.

F. Air masses are not pure and are modified by journey of air from the region where it originates.

VI. Air mass convergence and deflection

A. Air flowing from the north meets the air flowing from the south in a slanting boundary line.

B. Due to the earth's rotation the winds tend to veer to the right in the northern hemisphere and to the left in the southern hemisphere. This is called deflection.

C. In the northern hemisphere the meridian lags behind the air (northbound air). Due to the pull of gravity the velocity of the air is added to the rotational velocity of the earth, giving increased centrifugal force and a greater force toward the equator. The reverse is true of a wind blowing south.

D. As cold air comes from the north it has a boundary called a front. Motion tends to be in opposite direction to the warm air mass, but not perpendicular to the boundary line. This last phenomena is called "waves."

VII. Wave theory

A. Cold and warm fronts
1. When cold air is advancing upon warm air the front is called a cold front.
2. When cold air is being pushed forward by cold air, or the cold air is receding and warm air is moving in, the front is a warm front.

B. Occlusion
1. Cold front occlusion — cold air from behind the wave overtakes some lagging cold air in front of the wave and either climbs over it or wedges under it.

C. Stable and unstable waves
1. Waves that occlude are called unstable; those that do not, are stable waves.

D. Wind shift line — a front is called a wind shift line, in fact, for many years this was the recognized theory before the wave theory.
1. Can either be a shift from one wind to another or a shift in the direction of the same wind.

E. Low or cyclone
1. Because of the circulatory motion of the air around the apex of a wave the centrifugal force tends to force the air away from the center of rotation. This causes low pressure in the region of the waves and is called a *low;* the circular motion gives to this the name cyclone.

F. Winds in regard to gradients, cyclone, and gradient winds.
1. Winds tend to blow from high pressure to low pressure but in a direction deflected toward the isobar.
2. Centrifugal force of rotation and the force of deflection counteract the force of a pressure gradient; hence the wind may blow parallel to the isobar or perpendicular to the pressure gradient.
3. When winds at a certain level blow parallel to the isobars it is a gradient wind at gradient level.

G. Highs
1. When isobars on a map show an increasing pressure toward the center it is a high (anticyclone).
2. Winds in a high tend to blow away from the center; in the northern hemisphere in a clockwise direction.
3. Buys-Ballot's law — if you stand in the northern hemisphere facing the direction the wind is blowing the low is on your left.

H. Air in a low tends to rise, especially in the center, and flow outward from the center at high altitudes, and a high tends to subside, especially in the center, and flow in toward the center at high altitudes.

I. Air in a high tends to be dry and clear — clouds can form only when there are rising currents or other causes of cooling.

J. Cold domes are moving mountains of cold air. They are immense in size, sometimes 2000 feet long and one mile high, or up to three miles high by 2000 miles long.

VIII. Cloud forms

A. Clouds
1. Two classes
a) Form
1) Stratiform form in layers and tend to remain in layers — more stable air.
2) Cumilform — cumulate with vertical motion relative to the surrounding air.
b) Composition
1) Ice cloud — contains ice crystals.
2) Water cloud — contains water droplets.
3) Clouds are held up because the volume and the surface cause a friction with air so great that the tiny droplet cannot move and is held suspended.
c) Altitude — high (above 20,000); middle (20,000 to 6500); and low (under 6500).
2. Cloud forms
a) Cirrus — 33,000, are detached, fibrous, and white.
b) Cirro stratus — 32,000, are thin, white, veilish, cause halos.
c) Alto stratus — 27,000, are layers of white flakes or globular masses.
d) Cirro cumulus — 20,000, gray or bluish, like cirro stratus but have no halo; moon shows through faintly.
e) Alto cumulus — 15,000, a layer of globular masses.
f) Stratus cumulus — 9000, a layer of globular rolls, fairly large, gray.
g) Cumulus — 6000, a thick cloud with vertical developments, base horizontal, upper surface dome-shaped.
h) Cumulus nimbus — 4500, base to 20,000 top surface.
i) Nimbo stratus — 3000, low, rainy layer dark gray in color.

IX. Safety practices in regard to weather

A. Clouds — do not fly through without special instruments.

B. Vertical air currents — cause turbulence, so fly early or late, or fly high.

C. Thin air — less pressure; cannot gain altitude as fast; the take-off run is dangerous.

D. Fog — stay down; or if up get down immediately.

E. Icing — get out of cloud layer or fly above freezing level; or fly below the freezing level.

F. High wind — do not attempt take-off and be careful of landings.

G. Thunderstorms — stay out of them or land if you cannot stay out.

H. Line squalls — sudden shift in direction of the wind — no landings — set plane down and sit tight until it passes. May fly through but watch for turbulence.

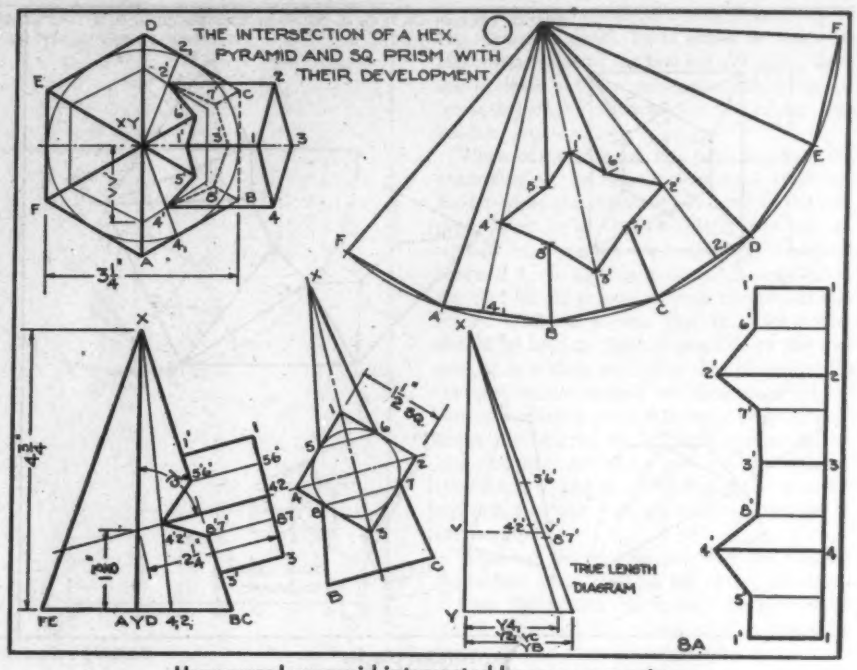
I. Variable and gusty wind — watch take-offs and landings.

J. Tornado — fly around if it does not travel fast horizontally.

K. Falling barometer means a storm on the way.

L. High barometer — bad weather is past, so fly.

(To be continued)



Hexagonal pyramid intersected by a square prism

PROBLEMS IN SURFACE DEVELOPMENT

FREDERICK NEUSCHEL, JR.

North Tonawanda High School, and School of Engineering, University of Buffalo
Buffalo, N. Y.

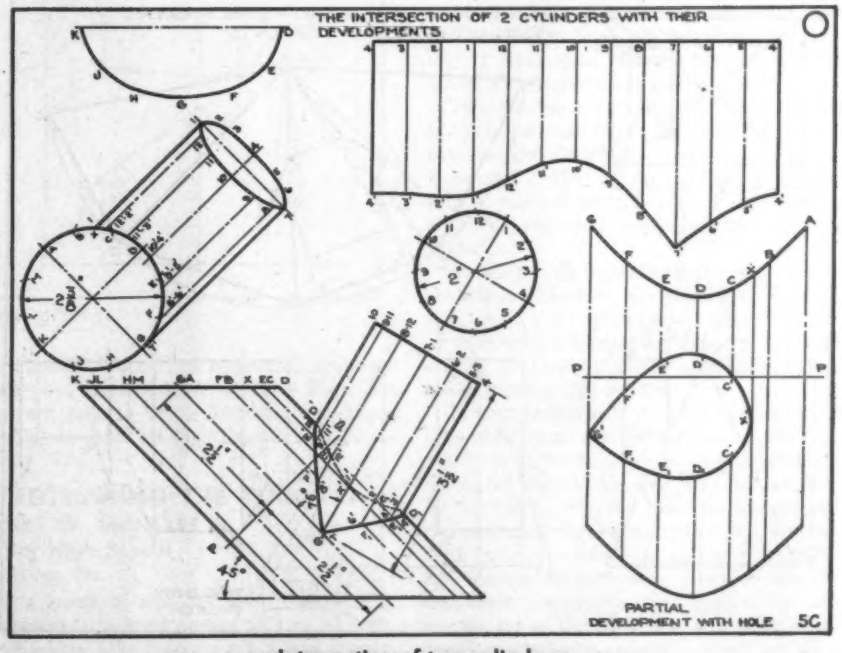
The teaching of surface developments can be one of the most interesting phases of mechanical drawing instruction. However, some students find it difficult to find the intersection of pieces and develop them. These plates are samples of the way I present the work.

Each drawing is made to scale and numbered and lettered. In general, the outside points of the pieces are numbered or lettered and the corresponding points of the pieces are similarly numbered or lettered using prime or sub marks. In this system the number of letters and figures is reduced to a minimum. Then, too, it is easy to associate outside points with intersecting points since the same figure or letter is used. The difference in scale between the print and the student's actual drawing prevents the student from copying. I have also found these prints advantageous in handling the above average students. These students, with little or no help from the instructor, can teach themselves from the sheets.

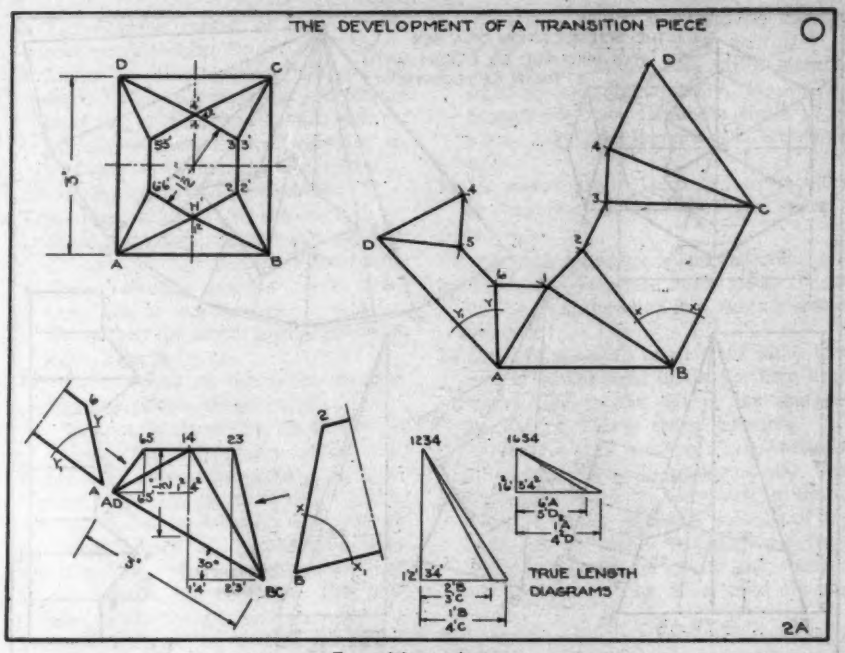
Each plate is easily drawn on an 11 by 17-in. sheet. The developments are convenient to draw and make excellent models. In my classes, each student is required to make a model from his drawing.

An auxiliary view, true length diagrams, and a cutting plane are the necessary tools with which to develop the right hexagonal pyramid and the square prism. The partial auxiliary view shows the true section of the prism and locates six points of intersection. To locate the two remaining points, a receding plane is passed through the right prism and pyramid in the front view. This plane truncates the pyramid and creates a rectangular plane in the prism. Where the truncated section of the pyramid and the rectangular plane intersect, the required points are located in the top view. The front view can be completed by projecting the points into the front view. By means of the true length diagrams the points of intersection can be located in the development of the pyramid.

The intersection of two cylinders presents a problem, since its position on the paper is different. The small right cylinder intersects the large oblique cylinder where the numbered elements are shown. This is clearly seen in the left auxiliary view. When the hole was placed in the oblique cylinder, it was located with reference to the elements of the oblique



Intersection of two cylinders



Transition pieces

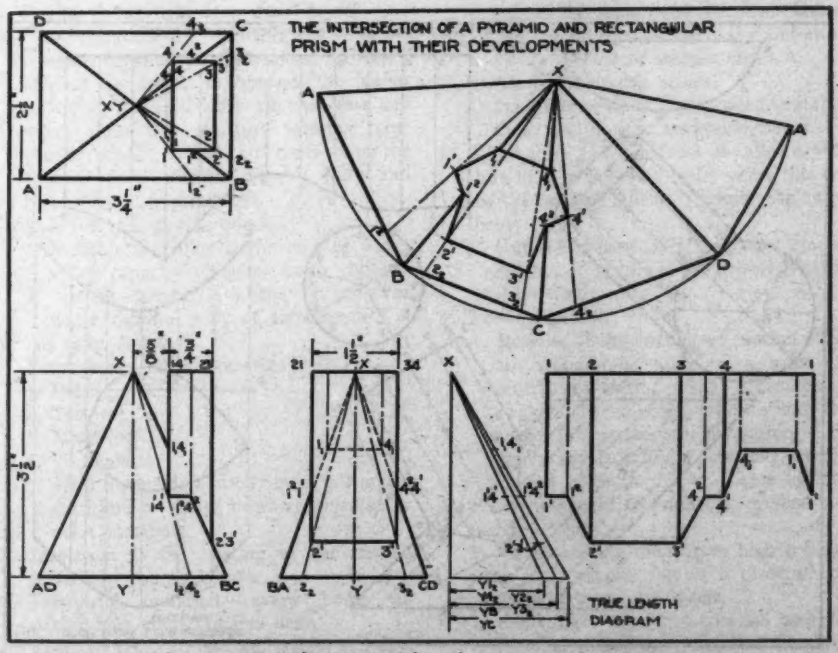
cylinder. In so doing, only one additional point had to be located (point x) since the elements of the oblique cylinder intersected the right cylinder at the points as shown. Line p–p is the reference line for developing the oblique cylinder. It was placed in the center for convenience.

Three views of the two prisms are necessary for finding the points of intersection. From the top and side views, intersecting points can be found in the front view. Upon completing the three views, each piece can be developed by taking measurements directly from any view, since the points can be located on lines that are parallel to the principal planes of projection.

Transition pieces are a good means of teaching triangulation. The one illustrated requires two true length diagrams. In addition, a left and right auxiliary view is needed to determine the angle between the sides. If the student thinks of the piece as made up of a series of surfaces, then the development of each surface will be constructed from true lengths of lines and the surfaces built one next to the other so that one piece when folded will give the required development.

By drawing three views of the right pyramid and right prism, the points of intersection can be found. Since the elements of the right prism are parallel to the vertical plane of projection, the points of intersection can be measured directly from the front or side views and placed directly on the development of the prism. The interesting part of the problem is to locate the hole in the pyramid to accommodate the prism. Lines from the vertex of the pyramid through the corners of the prism are drawn in the three views. Since the lines extend to the base of the pyramid they can be located on the development of the pyramid. Then a true length diagram is made on which the intersecting points are located. From the diagram the points are measured and transferred to the development of the pyramid.

When a cone and prism intersect, a different approach is required to solve the problem. I have found the cutting plane method a clear way to teach this problem. To find the intersection, horizontal cutting planes are passed through the front view at convenient points. These planes create circles and rectangles in the top view. From these circles and rectangles, points of intersection must then be determined after which they are projected into the front view. The prism can be readily developed by direct measurements from the views. When the hole is placed in the cone's development, elements of the cone are drawn from the vertex through the points of intersection in the top and front views and extended to the base. These elements are located in the cone's development. Since the length of the elements are the same and the front view of the cone contains the true length of the elements, the intersecting points are carried to the left side of the front view. From these points, measurements can be taken to locate the intersecting points in the development of the cone. A true length diagram is not necessary if the student realizes that the elements of the cone are true in the front view.

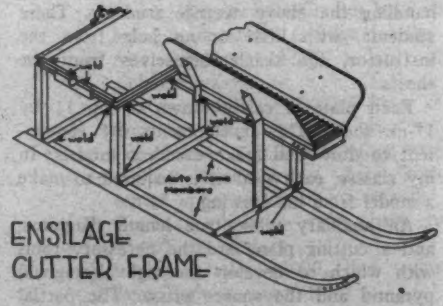


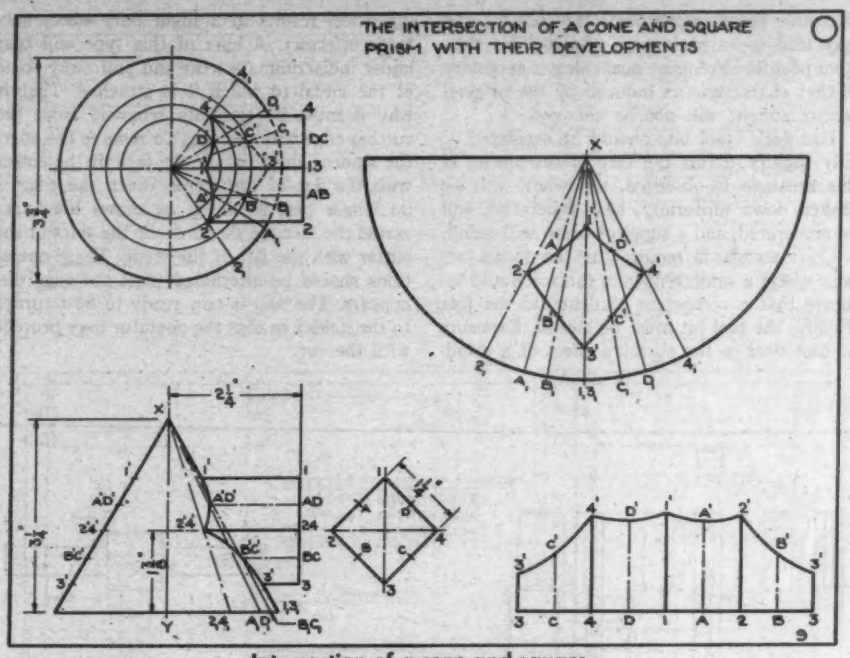
Intersection of a pyramid and a rectangular prism

ENSILAGE CUTTER FRAME

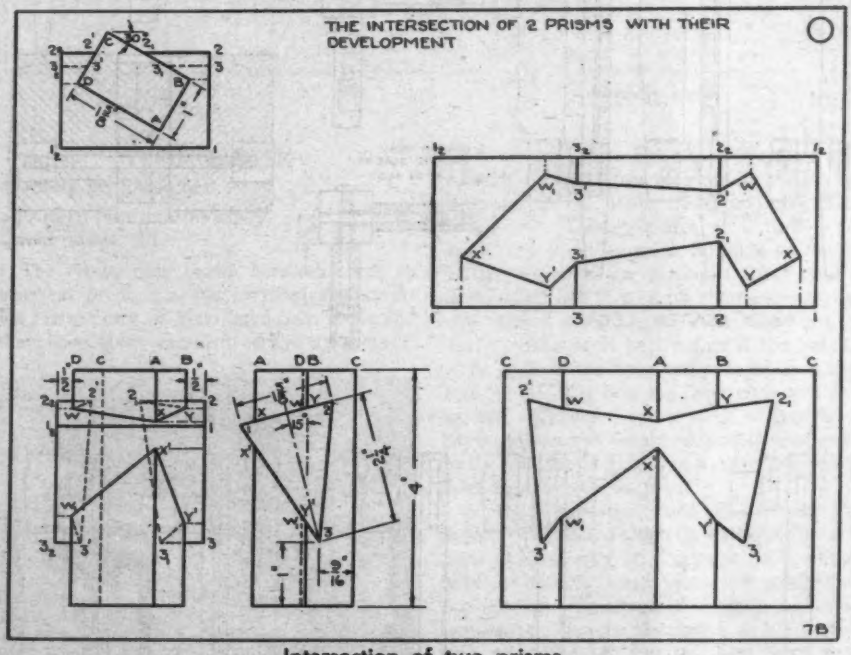
JAMES F. LINCOLN
Cleveland, Ohio

Ensilage cutters get rough treatment when they are moved from one silo to another. The skid frame shown herewith was fabricated by





Intersection of a cone and square



Intersection of two prisms

C. G. Hammerbeck, Little Falls, Minn. It has survived the shocks of years of service.

A visit to an auto graveyard provided the necessary materials for the ensilage cutter frame. The side members of a car frame were used for the skids. Angle irons were used as cross braces between the skids and the angles were placed to provide support for the uprights in the frame. A V cut in a piece of angle iron allowed it to be bent. The cut was then welded so there was no weakness at the bend.

The metal frame resists weathering and hard knocks of operation better than a wooden frame. — From the book, *Welding Helps for Farmers*, soon to be published by The James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio.

REGRINDING THE TOOL BIT

JAMES W. McINTYRE
Senior High School
Reading, Pa.

If a group of students were to observe a competent lathe hand remove his tool bit from the machine, take it to the wheel and regrind it, they would be able to report only a few of the measures which he observes in renewing the cutting edge of his tool bit. Actually, there are at least a dozen factors to which he attends before he replaces the bit in the tool holder.

When inspection of the tool warrants his regrinding it, he removes the tool from the holder while the holder is mounted in the tool post. Thus, he has both hands free to use the wrench and avoids loosening the tool-post screw if he is able to accomplish removal of the tool bit by release of only the tool-holder screw. While it is true that the tool holder should be held as close as possible to the tool post, it is seldom necessary that clearance for the tool-holder wrench be eliminated. Moreover, a wrench is used with most effect if both hands are able to apply the necessary power and restraint. After the tool bit has been retouched, it can be placed in a slightly extended position and will bear its original relation to the work.

There are several reasons why the student should not grind the tool bit before removing it from the holder. He is very likely to hold the tool against the wheel until overheating results if the stimulus of hand contact with the bit does not prompt him to quench it in time. Vibration under the strain of the tool-holder setscrew may crack the tool bit. Also contraction, under that same strain and with uneven heat dissipation due to proximity of the holder, may fracture the tool bit. Finally, the bulk and weight of the holder rob the hands of sensitivity and maneuverability.

Since the most important feature of any shop course is to make sure that no one gets hurt, safety goggles must be worn while grinding.

Before a mechanic uses the grinding wheel, he makes certain that the tool rest fits closely about the wheel and that it is secure in its position. Appreciable clearance between the rest and the wheel exposes the danger of work or even fingers becoming lodged in the opening. If work jams between the rest and the wheel, the grinder shaft may become bent.

Tool clearance is ground with the tool held in the same position relative to the wheel as it bears to the work when it is mounted in the lathe tool holder. When the tool is held in such a position for grinding, the full contour is visible and most easily controlled by the student.

Grinding is to be done on the periphery of the wheel. Therefore, the initial grinding position, as just set forth, would affect the side of the tool with a concave clearance. Just such a slight concavity is desirable because it minimizes cutting-edge friction.

Contact between the tool bit and the wheel is established at the heel portion of the tool. After the initial heel portion of the contact is made, the body of the tool bit (the part held in the hand), may be raised so the original clearance angle can be maintained or corrected. With experience comes the ability to sense the full bearing of the side of the tool bit (the area below the cutting edge), against the convex portion of the wheel. If the student is regrinding a tool of a delicate contour, an effort

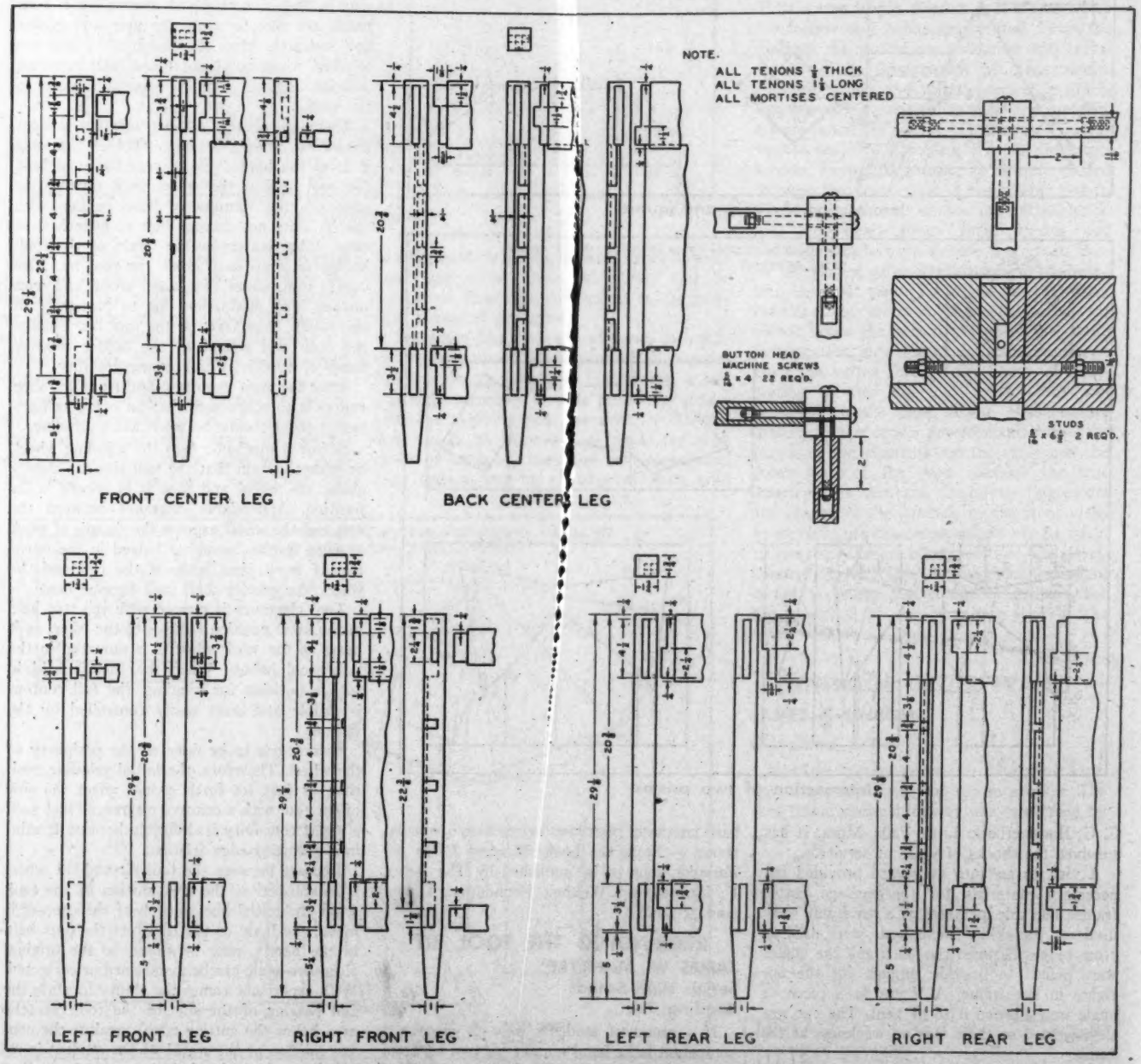
to establish full, immediate contact between the wheel and the side of the tool bit may result in damage to the cutting-edge profile. It is not too much to ask that recognition of this method of presenting the tool to the wheel be considered after every interruption.

The body of the tool bit may be held in the hand which can most conveniently manipulate it to secure the desired effect. Two fingers of the other hand are placed on the tool rest and serve as a support to the first hand. The thumb of the supporting hand reinforces positions taken by the manipulating hand.

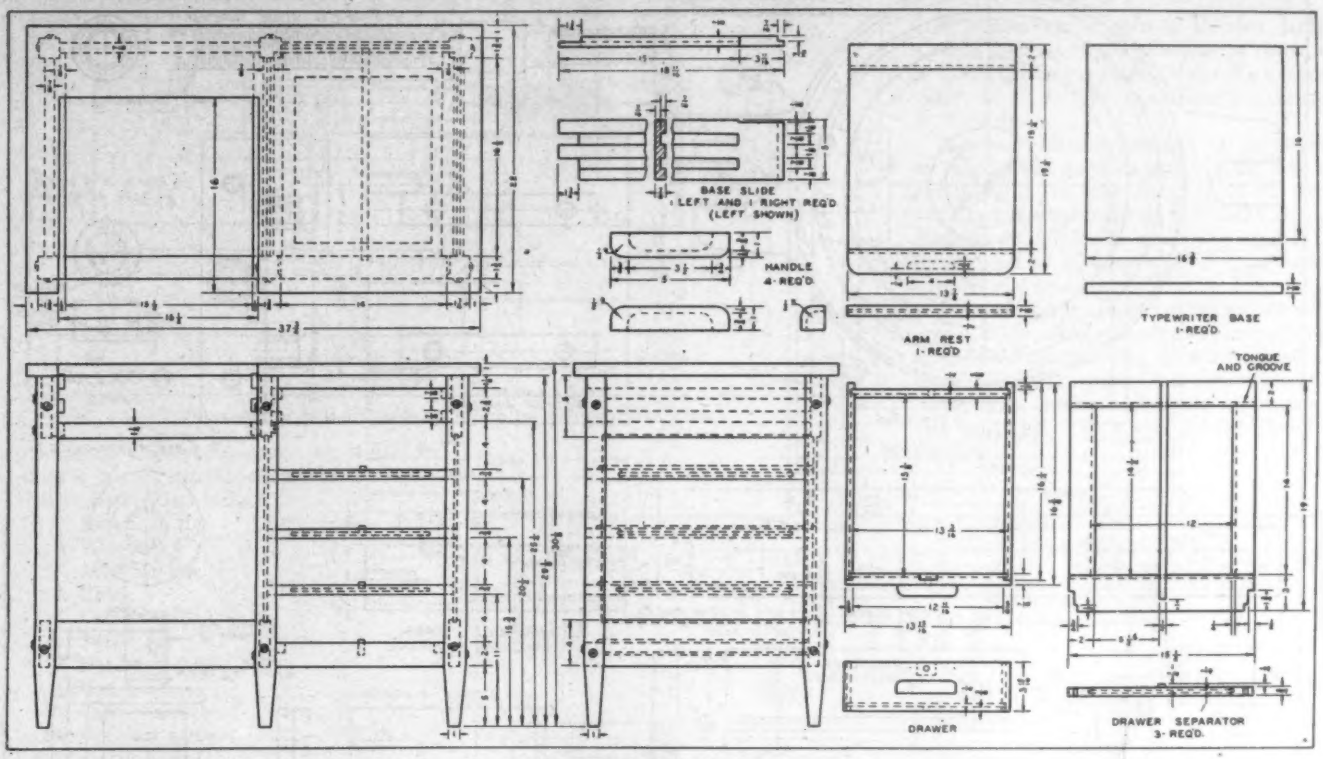
The student must use only a moderate pressure to hold the tool bit against the wheel. Excessive pressure overheats the tool bit and may lead to an accident if the tool bit slips from position. Frequent quenching is necessary so that characteristics induced by the original heat-treatment will not be changed.

The work (tool bit) should be oscillated, if only slightly, across the face of the wheel. If this measure is observed, the wheel will be broken down uniformly, heat generation will be moderated, and a superior finish will result.

Craft standards require that no facets appear where a smooth-flowing surface would indicate that a competent student did the job. Finally, the tool bit must be stoned. Exposure of tool steel to the abrasive effect of a grinding wheel results in a slight burr where surfaces intersect. A burr of this type will tear under indiscriminate wear and pull away some of the metal to which it is attached. That is why it must be carefully removed from the cutting edge with a stone. To remove the edge, the student should stone the face of the cutter with the flat of the stone. When the edge is no longer perceptible as he draws his finger across the face, he should stone the sides of the cutter with the flat of the stone. These operations should be alternated until the edge disappears. The tool is now ready to be returned to the holder so that the operator may proceed with the cut.



Leg detail of typing desk. See page 435 for further details



Typing desk

TYPING DESK

ROBERT W. ENGLISH
Southern Illinois University
Carbondale, Ill.

The typing desk shown herewith made an excellent production job for the cabinetmaking class. Forty of them have been made and they have given excellent service since 1941.

TREATMENT OF OIL-SOAKED FLOORS

(Taken from June, 1947, American School Board Journal, *"The Treatment of Wooden Floors" by Dave E. Smalley)*

Oil-soaked wooden floors can be reclaimed, sealed, and waxed, even those saturated with oil for many years. The old oil is removed by a series of scrubbings with regular oil solvent preparations or with trisodium phosphate. Simply wet a limited area at a time — not more than 10 feet square. Sprinkle on the alkaline powder freely, stirring it about until it is dissolved and then scrub vigorously, preferably with a scrubbing machine. Squeegee up the oily solution at once before it has time to settle back in the floor and proceed to a new area. After going over the floor, rinse well and let the floor stand for a week or ten days, allowing the more deeply imbedded oil to arise to the surface. During this waiting period the floor may be used as usual.

A second cleaning, exactly like the first, is usually sufficient, though in extreme cases a third cleaning may be necessary. If the floor has been oiled for many years, it is good practice (though not essential) to apply a coat of lacquer-type sealer. The latter will not mix with embedded oil, but will seal the pores, drying quickly.

After removing the oil and when the floor is dry, there may be "salty" spots indicating insufficient rinsing, in which case the floor should be rinsed again.

After the floor is quite dry, it is advisable to go over it with steel wool to smooth down the raised grain and remove possible foot tracks made during the drying period. Then apply the sealer and wax as directed in the foregoing cases.

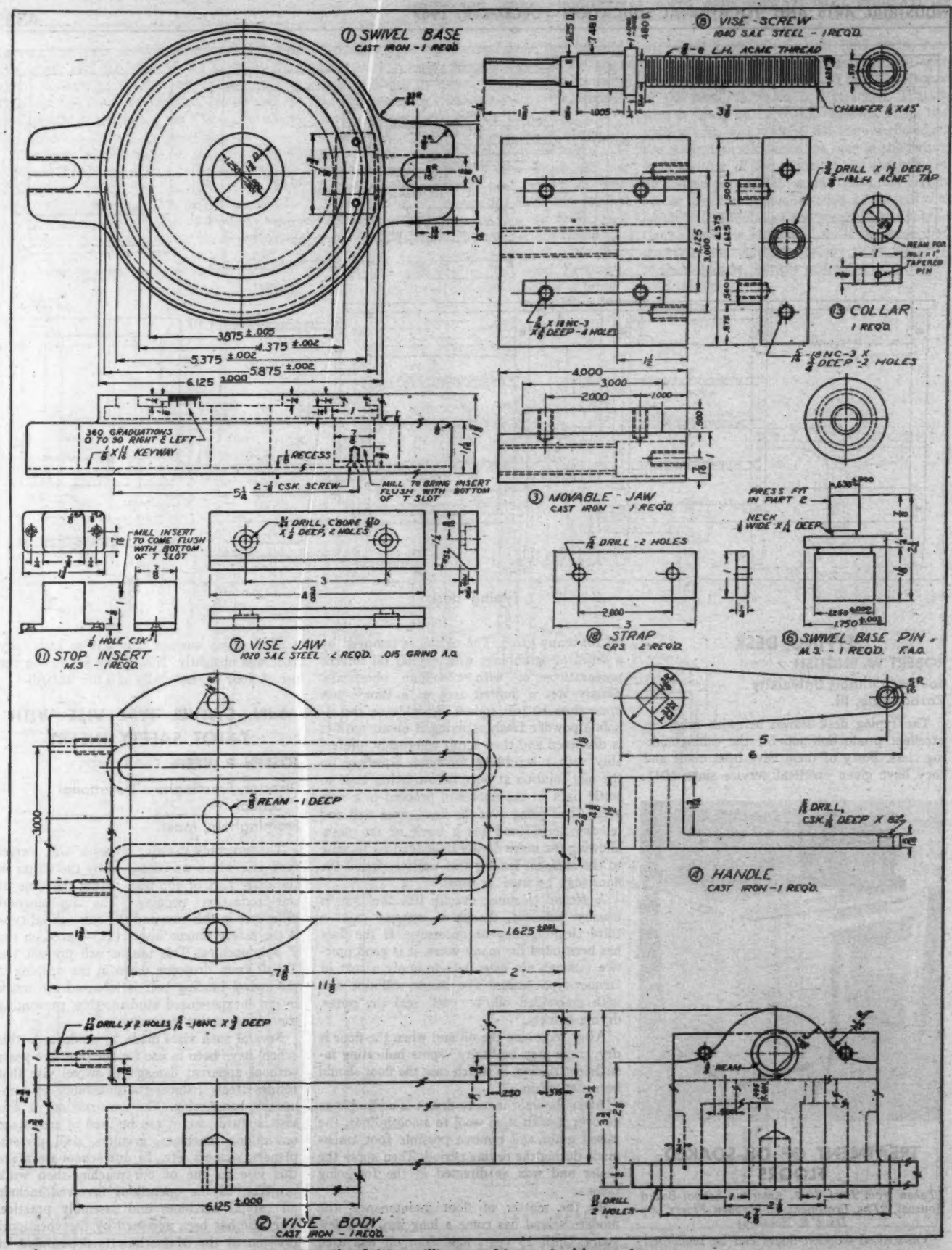
In the matter of floor maintenance, the modern school has come a long way in a few years. Until 15 years ago, floor oil was used almost universally on wooden floors, providing a dark, grimy surface that was as insanitary as it was unsightly. Now many states ban the use of floor oil, especially as a fire hazard.

4-IN. SWIVEL TYPE VISE WITH T-SLOT SAFETY INSERT

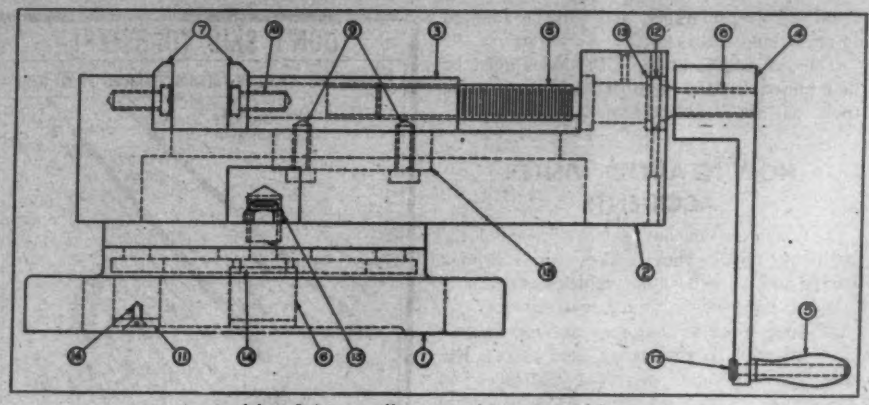
JOSEPH P. KEEFE
Director, Framingham Vocational School
Framingham, Mass.

The assembly drawing shows a 4-in. swivel type vise which was designed by the writer in the early part of the war, during the time of war-production training. The fundamental difference in this vise and the commercial type is the safety tongue insert (11) placed on the *T* bolt opening. This tongue will prevent the T bolt from dropping down in the opening if the swivel binding bolt is loosened too much by an inexperienced student, thus preventing the swivel action jamming.

Several such vises made by students in this school have been in use for the past five years without apparent damage. A swivel vise that rotates freely reduces the possibility of damage by hammering. The construction of this vise is sturdy and it can be used to advantage on milling machines, grinders, drill presses, planers, shapers, etc. In our school we make this vise as one of our machine-shop work projects, as the operations involved include all capital machines and assembly practice. The vise has been accepted by the vocational division of the Massachusetts department of education and several of the many trade and


① SWIVEL BASE
CAST IRON - 1 REQ'D
⑤ VISE SCREW
1040 S.A.E. STEEL - 1 REQ'D.
⅝-8 L.H. ACME THREAD
CHAMFER ⅛ X 45°
⅜ DRILL X ½ DEEP
⅜-10 L.H. ACME TAP
REAM FOR No. 1 x 1" TAPERED PIN
② COLLAR
1 REQ'D.
⅜-16 NC-3 X ½ DEEP - 2 HOLES
⅜-16 NC-3 X ½ DEEP - 4 HOLES
③ MOVABLE JAW
CAST IRON - 1 REQ'D.
360 GRADUATIONS 0 TO 90 RIGHT & LEFT
⅛ X 1/16 KEYWAY
RECESS
2-¼ CSK. SCREW
MILL TO BRING INSERT FLUSH WITH BOTTOM OF T SLOT
PRESS FIT IN PART ②
NECK ¼ WIDE X ¼ DEEP
⑥ SWIVEL BASE PIN
M.S. - 1 REQ'D. F.A.O.
MILL INSERT TO COME FLUSH WITH BOTTOM OF T SLOT
⅜ HOLE CSK.
⑪ STOP INSERT
M.S. - 1 REQ'D.
⅝ DRILL, C'BORE ⅞ D X ¼ DEEP, 2 HOLES
⑦ VISE JAW
1020 S.A.E. STEEL - 2 REQ'D. .015 GRIND A.O.
⅝ DRILL - 2 HOLES
⑧ STRAP
CR3 - 2 REQ'D.
⅜ DRILL, CSK. ⅛ DEEP X 82°
④ HANDLE
CAST IRON - 1 REQ'D.
⅝ REAM - 1 DEEP
⅝ DRILL X 2 HOLES ⅜-16NC X ¾ DEEP
⅝ DRILL 2 HOLES
② VISE BODY
CAST IRON - 1 REQ'D.

Details of 4-in. milling machine swivel-base vise



Assembly of 4-in. milling machine swivel-base vise

vocational schools throughout the state are using it in their machine-shop course.

The list of parts include:

1. Base
2. Vise body
3. Movable jaw
4. Crank
5. Crank handle
6. Swivel pin
7. Hardened jaws
8. Vise screws
9. Carrier screws
10. Vise jaw screws
11. Safety insert
12. Tapered pin
13. Shaft collar
14. *T bolt*
15. *T* bolt nut
16. Flathead screw
17. Crank handle pin
18. Sliding jaw guides

PREPARATION FOR LIFE

ALEXANDER STODDART

Hershey Estates
Hershey, Pa.

Herbert Cassel, electrical shop instructor of the Hershey Vocational School, Hershey, Pa., has made a survey of the past six years of his work teaching boys the electrical trade, and finds that of the 60 boys who were graduated from 1500 hours of work only eight are known to be unemployed or employed in work outside the field for which they were trained. Another 1500 hours is given to related science, drawing, mathematics, English, and history.

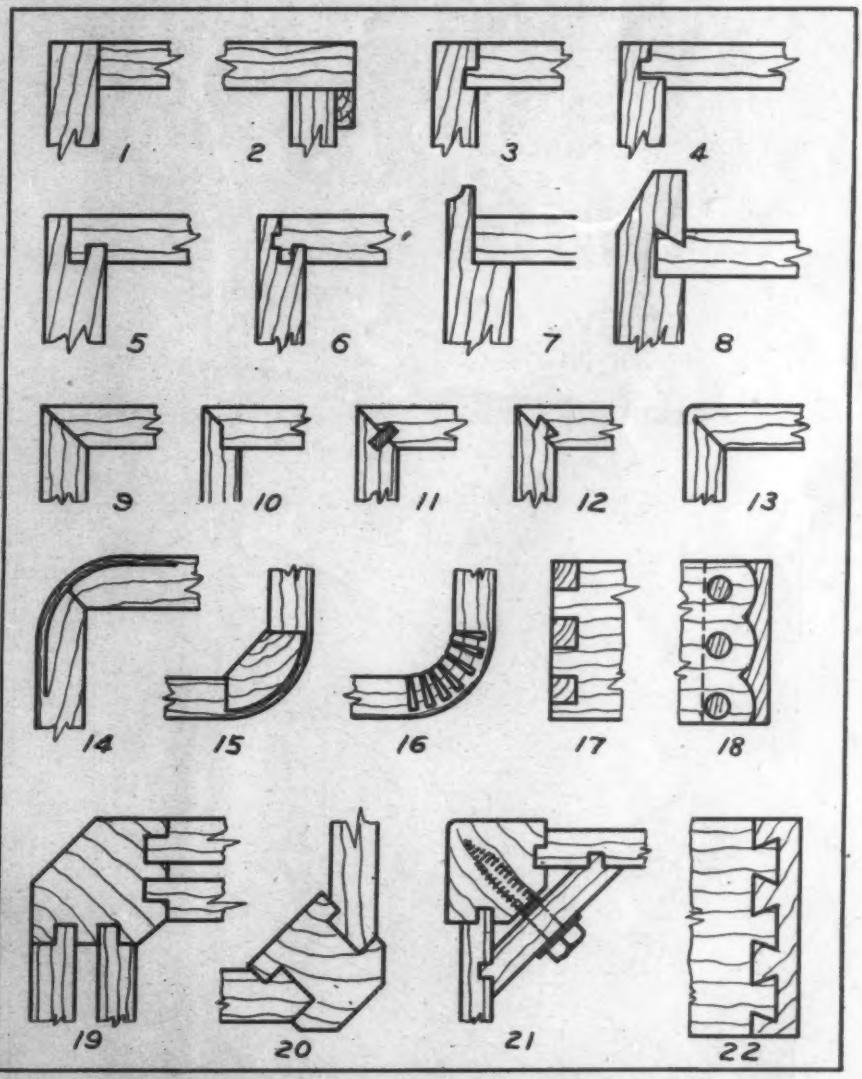
Five of the boys have started businesses of their own, one of them being in the wholesale electrical supply business. One student who went to Haverford College and later transferred to Bucknell University on a naval training program was graduated as an electrical engineer and an ensign in the navy. Now he is with a large corporation making telephone equipment.

Others are engaged in electrical work in the merchant marine, Middletown Air Depot, United States Army in Panama, and another is with the Stevens Engineering Company of Lancaster. The remainder of the 69 graduates work at the trade they learned and are employed in various towns and cities.

A number are enrolled in Hershey Junior College and others are planning to enroll in a state teachers college, Mercersburg Academy, or attend the Bliss Electrical School in Washington.

This year's class started with 42, the largest in Mr. Cassel's six years of operation, and 41 are at work. The boys attend to all the electrical maintenance work of the school building. Students often bring in repair jobs, motors to be rewound or appliances of all kinds to be adjusted and repaired.

The electrical shop is one of the seven trades taught in the school, the others being printing, sheet metal and plumbing, carpentry, machine shop, auto body repair, and agriculture. An eighth shop consists of building maintenance and repair work. Each year the boys build a dwelling.



Corners for wood cases, drawers, etc. This illustration is repeated because of errors that appeared in the one shown on page 170 of the April, 1947, issue.

The article was presented by F. D. Van Volkenburg, Kalamazoo, Mich.

DRESSING UP THE TOOLROOM

A. G. LAMBERT
Edison Vocational High School
Baltimore, Md.

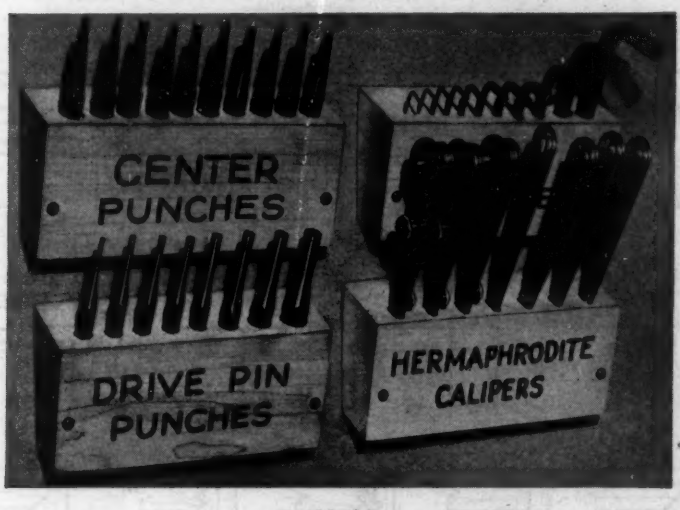
While we are still thinking in terms of reconversion, it might be well for us to take a look at some of our toolrooms.

In our shop it was necessary to mount many tools in rather cramped quarters and we found that the holders, shown in the illustrations, helped us solve our problem.

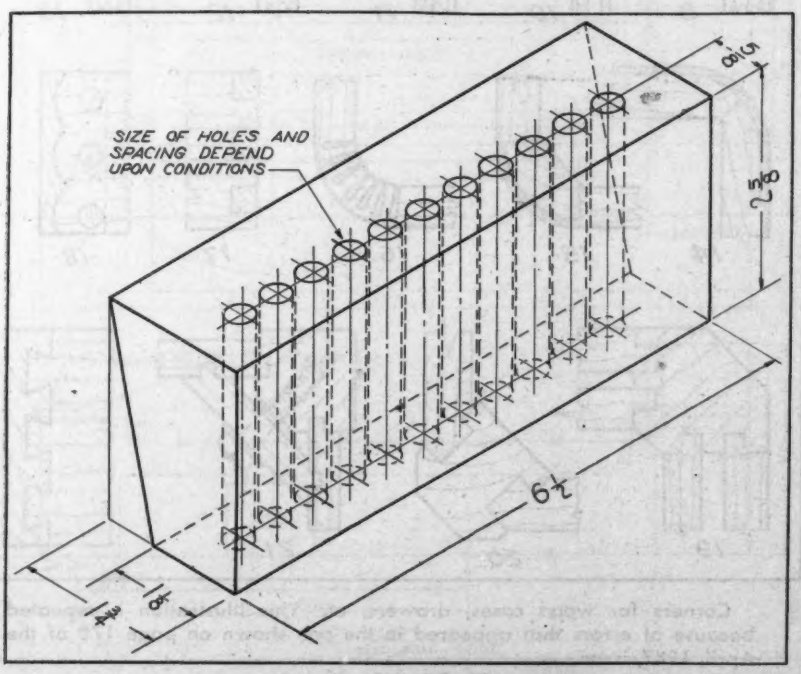
It is apparent that by mounting the tools in the blocks shown, much space may be conserved, and the tools may be taken out and replaced with the greatest ease.

The blocks may be made out of any hardwood, maple preferably, and may be adapted to many kinds of tools.

The size and location of the holes must be determined by the number and size of the tools that are to be accommodated.



Tool holder

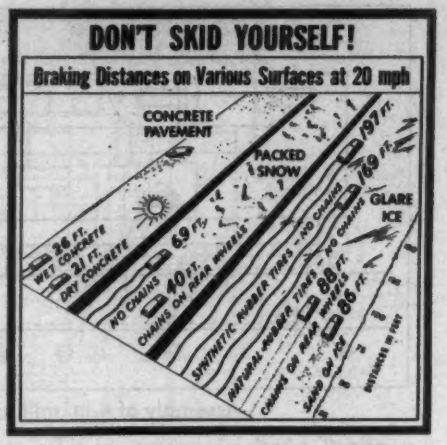


Details of tool holder

HOW TO AVOID WINTER ACCIDENTS

1. When starting out, get the "feel" of the road by trying your brakes while driving slowly and when no other vehicles are near.

2. On wet, snowy, or icy road surfaces, reduce your speed so that you can stop in time if faced with an emergency (see chart). Remember — you may find icy surfaces on bridges or shaded sections of an otherwise clear road surface. When snow-ice conditions generally prevail put on antiskid chains.



3. When you have to stop, apply your brakes lightly and intermittently — jamming on your brakes may lock them and throw your car or truck into a dangerous skid.

4. You must see danger to avoid it. Keep windshield and windows clear of snow and ice outside, and fog and frost inside.

5. Use tire chains on ice and snow. They reduce braking distances 40 or 50 per cent and provide needed "go" traction (see chart). Remember — chains are no cure-all for winter accidents, but they are indispensable under severe snow and ice conditions and will help the careful driver.

6. Synthetic rubber tires are now about equal to natural rubber in virtually all respects such as wear and braking ability on dry pavement. They do not, however, provide as good stop-and-go traction on snow or ice. Greater precaution is needed. Tests also prove that the theory of deflating or "softening" tires will not increase safety, and it will cause excessive tire wear.

7. Beware of carbon monoxide poison. Never warm up car in closed garage. Have exhaust system and floor boards checked for leaks. Manifold type of heater should not be used unless exceptionally rugged and checked frequently for leaks and other defects.

Personal News

♦ Willis C. Brown, of Arlington, Mass., has been made assistant specialist for aviation in the secondary education division of the U. S. Office of Education, Washington, D. C. Previously, he served in the War Production Training and Surplus Property Utilization programs of the office of education.

Mr. Brown has had extensive experience in the field of aviation education. He was first president of the Academy for Model Aeronautics, of Washington, D. C. He is the author of a book, *Airplane Models and Aviation*, and of a number of magazine articles on aviation.

His bachelor's degree was obtained at Boston University in 1934.

♦ Silas M. Ransopher, of Alexandria, Va., has been chosen as field representative in the voca-

(Continued on page 16A)

Noted for dependability, long life and economy

Disston Tools are carefully and sturdily built to meet the exacting requirements of the school workshop. They are made of the finest and most suitable steels, properly hardened and tempered to assure long life even when subjected to the inexpert handling of beginning students. Each tool is a product of Disston skill and thoroughness, and measures up fully to the high standards demanded by professional tool users.

Disston cutting tools are noted for their ability to cut faster, stay sharp longer and give more dependable service. Among the high quality Disston Tools that have won the widespread approval of School Shop Instructors, are those shown above. For maximum efficiency and economy, specify Disston Tools.

THE DISSTON SAW, TOOL AND FILE MANUAL will prove helpful to your students. Copies are supplied FREE by Hardware Retailers; or students may write to us direct.

HELPFUL EDUCATIONAL AIDS for use in your classroom will be sent to you without charge. These include Wall Charts; Saw, Tool and File Manual; and Industrial Product Manuals for teacher reference on the use and maintenance of saws and tools. Write to us for a complete set today.

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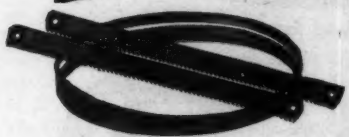

STARRETT HACKSAWS

There is a STARRETT Hacksaw for every job — Standard Flexible Back, All Hard and "Semi-Flex," "S-M" Molybdenum, "Safe-Flex" Class A—High Speed Steel and 18-4-1 High Speed Steel—for all kinds of hand sawing; "S-M" Molybdenum for light and heavy power sawing and High Speed Steel for power sawing of high alloy metals, stainless steel, phosphor bronze, tool steel, monel, etc.

STARRETT DIAL INDICATORS

Made in a full range of types, sizes, ranges and dial calibrations to meet American Gage Design Specifications. STARRETT also makes Dial Test Indicators and the widely popular LAST WORD Indicators.

THE STARRETT BOOK FOR STUDENT MACHINISTS

A handy source of information student machinists must have about tools, machines and modern methods. Prepared in cooperation with leading vocational training experts, it is written in simple shop language, contains more than 200 illustrations and 30 useful reference tables. Available through your local Starrett Tool distributor at ninety cents a copy. Descriptive Folder furnished on request.

STARRETT PRECISION MEASURING TOOLS

The fine workmanship and lasting accuracy that have made Starrett Tools the choice of skilled machinists have also made them standard school shop equipment. STARRETT Student Set No. 902 containing measuring tools essential for school shop classes is again available through your tool dealer.

STARRETT BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS, ETC.

STARRETT hard edge, flexible back Metal Cutting Band Saws are available in coils of any length or cut to length and welded. STARRETT "Skip-Tooth" Band Saws for fast cutting of magnesium, aluminum and other non-ferrous metals, also for wood, plastics and special compositions.

STARRETT STEEL TAPES AND RULES

STARRETT Steel Tapes are made for every purpose in lengths and graduated to suit every requirement. STARRETT Steel Rules are standard for accuracy, easy to read, made to suit every need or preference.

STARRETT EDUCATIONAL BLUE PRINT SETS

A valuable and practical instruction aid on the use of precision tools. The set consists of fourteen blue-printed 8" x 10½" punched sheets, each illustrating an important tool and its uses. Furnished to instructors and students at cost — 10 cents per set.

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(Continued from page 438)

tional education division of the U. S. Office of Education, Washington, D. C. Formerly he served the office of education in the Surplus Property Utilization, War Production Training, and Civilian Conservation Corps education programs. For a period following World War II, Mr. Ransopher served the War Department as vocational education consultant. His experience includes direction of vocational training in the public schools, in private industry, and in the military services.

Mr. Ransopher completed courses given by the army signal corps during World War I and was director of the first signal corps school. He received his bachelor of science degree at Kansas State College in 1911.

♦ HARTMAN C. DIGNOWITY, of Houston, Tex., received an appointment as specialist in trade and industrial education in the vocational education division of the U. S. Office of Education, Washington, D. C. Formerly he served the office of education in the War Production Training and Surplus Property Utilization programs.

Mr. Dignowity received his B.A. degree from the University of Texas in 1929; his M.A. from the same institution in 1934. He studied for his doctorate at the University of Leipzig from 1930–32.

♦ HOMER H. KEMPFER, of Prairie Home, Mo., has been made specialist for general adult and post-high school education, Washington, D. C., after six years in the New York state department of education where, in addition to administering an adult education program, he directed a local opinion poll, "What Buffalo Thinks," during the past year.

Mr. Kempfer's bachelor's degree in education was obtained at Central Missouri State Teachers College in 1933. He received his M.A. from the University of Missouri in 1935, and his doctorate in education at Teachers College, Columbia University in 1941.

STATE SUPERVISORS OF INDUSTRIAL ARTS

The following two instructors of industrial arts have joined the staff of the State Board for Vocational Education at Springfield, Ill., to supervise the industrial-arts program in the state.

Theodore A. Koschler received his B.S. degree from Bradley University, has taught industrial arts for seven years, and has had five years of trade and technical experience. He left teaching

T. A. Koschler

in Illinois in 1942 to become a supervisor of the Radio Electricians' School at Fort Knox, Ky. In 1943 he accepted an army commission, serving as an air communications inspector and later as a staff electronics officer in the Twentieth Air Force during the air offensive of Japan. After separation from the service as a captain, Mr. Koschler secured his M.S. degree at Iowa State College in industrial education. His fields of technical preparation are in electricity, radio, electronics, auto, and aviation. Mr. Koschler will supervise the northern half of the state.

Dale Roberts has been in the industrial education department since September, 1946. Mr. Roberts came to the State Department after 12 years of teaching industrial arts in the state of Illinois. A graduate of James Millikin University, Mr. Roberts' professional background includes

Dale Roberts

graduate work in industrial education at the University of Illinois. He has for a number of years played an active part in industrial arts activities. During the past year he served as vice-president in charge of the industrial arts section of the I.I.E.A. In addition, he has taken an active interest in the I.I.E.A. round-table activities, and served as a member of the executive board of the Metropolitan round table from 1944 to 1946. Mr. Roberts will supervise the southern half of the state.

(Continued on page 18A)

New Now you can enjoy famous Delta quality in a machine for teaching heavy-duty operating technique!

Delta* 20" Wood-cutting Band Saw

$325.00 without miter gage, motor, or switch

Takes any type of blade in any size up to 1 inch in width. Maximum height under upper guide is 13½"

Because it's engineered for safety, accuracy, and convenience, the new, low-priced Delta 20" Wood-cutting Band Saw is a practical tool for woodworking instruction purposes. And it is available now!

Delta 20" Band Saw features are among the newest and most advanced in the industry — many of them exclusive with Delta:

- To safeguard students, single-unit welded steel cabinet completely encloses all working parts. Doors provide quick access to wheels and motor.
- Adjustable "three-point mountings" between working parts and welded steel frame help to maintain exact alignment.
- Statically-balanced aluminum wheels are mounted in sealed-for-life ball bearings. Adjustable control on upper wheel helps to maintain proper blade tension for each particular job.
- Wheels are made of aluminum, to reduce flywheel action after motor is shut off.
- Convenient foot-brake is provided on lower wheel.
- Motor is mounted in base on pivot bracket which automatically provides correct belt-tension.
- Dust chute carries away dust and chips . . . can be attached to dust collector.

Your nearby Delta distributor can give you further reasons why it pays to specify Delta 20" Wood-cutting Band Saws on your equipment requisition. See him. Look for his name under "Tools" in the classified section of your telephone directory.

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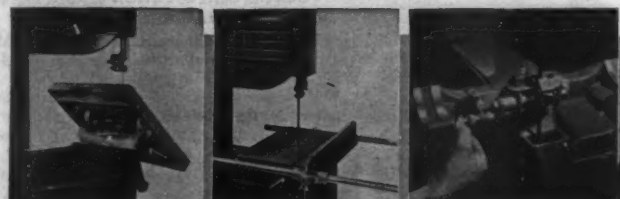
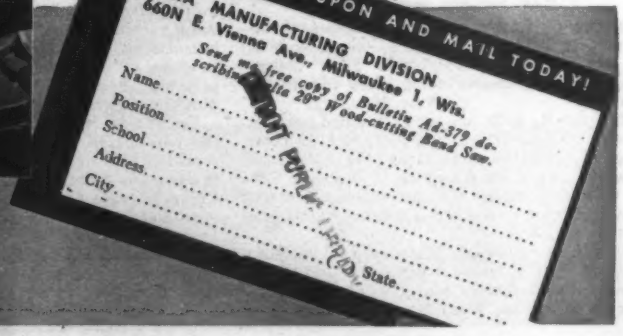


20" x 24" table is rigidly supported on two widely-spaced trunnions. Conveniently tilts 45° to right; 12° to left.

Heavily-ribbed table is slotted to accommodate miter gage. It is also adaptable to use of a rip fence, as shown.

Ball-bearing blade guides, above and below table, are fitted with micrometer adjustment.



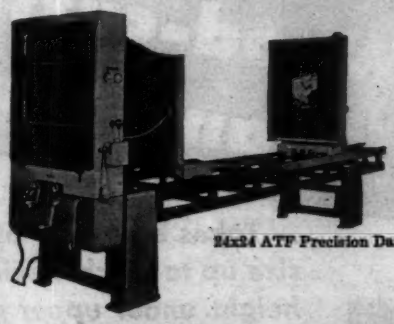
8-38

Train Students

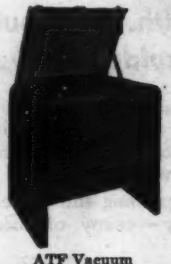
on the same Modern Equipment

which Industry Endorses!

An ATF Offset Department is essential to the modern Vocational School Print Shop



24x24 ATF Precision Darkroom Camera



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ATF Plate Whirler

ATF Cooltop Layout Table

Everything for the School Print Shop

Write for Illustrated Literature on a Complete Offset Department

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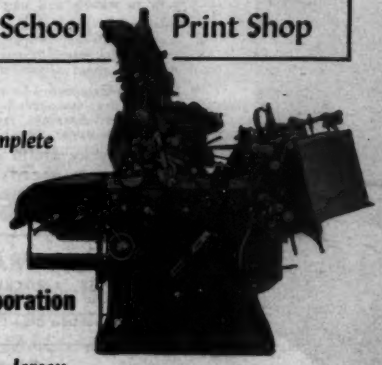


ATF Chief 22 Offset Press

(Continued from page 16A)

♦ OLIVER C. BUMB, assistant professor of industrial arts, Ball State Teachers College, Muncie, Ind., attended the Pennsylvania State College during the past summer doing work toward his doctorate.

♦ BERNARD R. JOSIF has been appointed assistant professor of industrial arts at Ball State Teachers College beginning the fall quarter, 1947. Mr. Josif did work toward his doctorate at Teachers College, Columbia, during the past summer. He was recently director of industrial and vocational arts at Pfeiffer College.

♦ DON S. PATTERSON, of Blaine, Wash., has been appointed chief of school organization and supervision of the elementary education division, U. S. Office of Education, Washington, D. C. He came to the office of education from the Bremerton, Wash., school system where he directed the city's instructional program for three years and served as dean of the newly organized junior college program. Previously, Mr. Patterson was state director of elementary education in Alabama.

From 1936–38, Mr. Patterson was president of the Washington State Elementary Principals' Association. He received his bachelor's degree at Washington State College in 1930; his M.A. at Colorado State College in 1936. He studied for a year and a half at Teachers College, Columbia University.

♦ RALPH W. POLK, supervisor of printing in the Detroit public schools, retired on June 20, 1947, after a teaching career of 33 years.

He came to Detroit in 1927 after serving as principal of the Robideaux Polytechnic High School at St. Joseph, Mo. His efforts at Detroit have resulted in organizing an outstanding program of printing education for intermediate and technical high schools.

He is the author of two textbooks on printing.

♦ ROBERT M. SHIELDS has been named head of the printing department at Cass Technical High School, Detroit, Mich., and supervisor of printing in the Detroit schools.

♦ EVERETT C. DABE, former vocational adviser for the Veterans Administration in 22 southeastern Ohio counties, has been named principal of the Ohio School of Trades, Columbus, Ohio, which was opened recently at 804 Mt. Vernon Ave., to train automobile mechanics.

♦ ARTHUR L. BENSON, of Easton, Md., has been appointed specialist in individual inventory and counseling techniques in the occupational information and guidance service of the vocational education division of the U. S. Office of Education, Washington, D. C. He came to the office of education from the Maryland state department of education, where he served as assistant state supervisor of guidance activities. Previously, during World War II, Mr. Benson was statistical control officer in the Adjutant General's Office, War Department.

Mr. Benson received his bachelor's degree at Lehigh University in 1933. He took graduate work at Lehigh and Johns Hopkins Universities.

♦ HARRY R. BAKER, who was graduated from The Stout Institute in 1943, has completed training for the Lutheran Ministry at the Lutheran Theological Seminary at St. Paul, Minn. He has been appointed pastor of Our Savior's Lutheran Church, Columbia Falls, Mont.

After being graduated from Stout, he taught printing at the Wausau Vocational and Adult Education School, Wausau, Wis.

♦ ALAN R. PAWELEK has been appointed assistant professor of industrial arts at Ball State Teachers College beginning the fall quarter, 1947. He is working toward his doctorate at the University of Minnesota. He has recently returned from overseas service as head of vocational and pre-engineering division of USAFI — Japan.

♦ ROBERT H. MCGINNIS, assistant professor of industrial arts, Burris Laboratory School, Ball State Teachers College, did work toward his master's degree at The Stout Institute during the 1947 summer session.

♦ RAYMOND SCHMIDT, board member, was transferred from Allderdice High School, Pittsburgh, Pa., to Washington Vocational School, this fall, as a related science teacher.

JAMES R. GLENN DIES

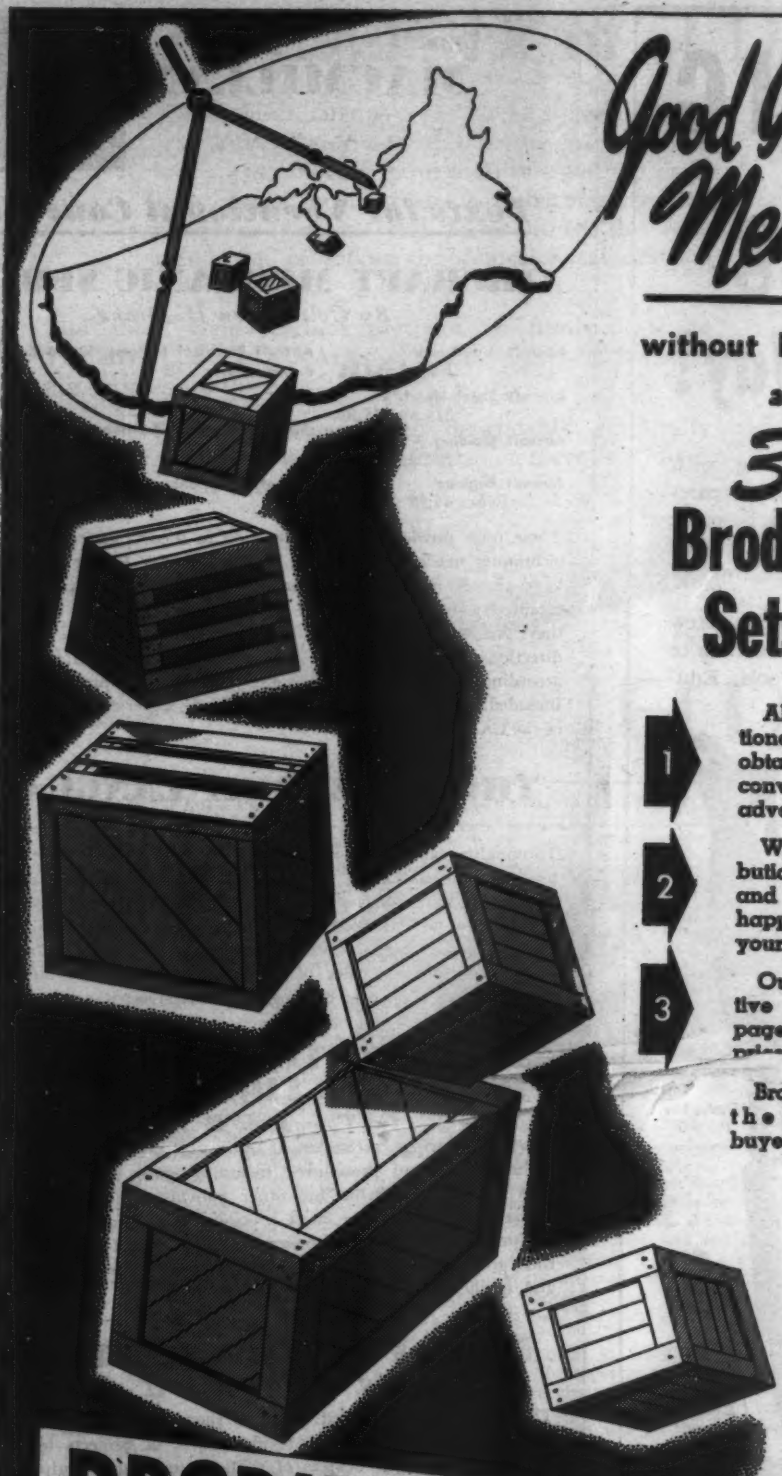
James R. Glenn died during September at his summer home, Gun Lake, Mich. He was 73 years of age. "Jimmie" Glenn began his teaching in Pittsburgh in 1901. At his retirement six years ago he was supervisor in industrial education in the Pittsburgh schools, Pittsburgh, Pa. He also taught an evening class at the University of Pittsburgh. After his retirement Mr. Glenn followed his hobby of making and repairing violins and cellos. His death came as a shock and loss to all of his many friends.

VOCATIONAL EDUCATION LEADER PASSES AWAY AT MADISON

Alexander A. Graham, director of the Madison Vocational and Adult Education School, Madison, Wis., died recently after a brief illness.

Widely known for his efforts, which in 1911, resulted in the law requiring large communities in Wisconsin to establish vocational schools, Mr. Graham was the first director of the Racine Vocational School. He held this post for seven years.

Shortly before World War I, Mr. Graham was appointed supervisor for the state board of vocational adult education. He interrupted this work during the war years to do industrial teaching for the war department at Philadelphia ordnance plants. After the war he was again a member of the state board until 1925 when he became director of the Madison Vocational and Adult School.



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1. All vocational art and educational school supplies can be obtained from one source. A most convenient and time-saving advantage.
2. We have coast to coast distribution on all merchandise . . . and local salesmen who will be happy to call upon you to aid your buying problems.
3. Our catalog prices are competitive in every item listed on its pages. In most instances our prices are low below other sources.

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● Teach modern methods of soldering with Stanley Electric Soldering Irons. They are carefully built to deliver continuous heat at the point of soldering. Properly balanced, they help to make the soldering job simpler and easier.

Stanley Soldering Irons are available with screw tips and plug tips as shown in a range of sizes to handle all soldering jobs. Stanley Tools, Educational Dept., New Britain, Conn.

Stanley Iron No. 345 Plug Tip

The booklet "Expert Soldering" gives information about a new development, Stanley Armor Clad Tips, and correct soldering practice. Write for a copy.

Stanley Iron No. 340 Screw Tip

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Texts for Vocational Courses

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By Col. Rollen H. Drake

Aircraft Woodwork *197 pp., $3.50*

Aircraft Sheet Metal *233 pp., $5.50*

Aircraft Welding *254 pp., $4.00*

Aircraft Engines *Febr., $5.90 (prob.)*

Aircraft Electrical Systems, Hydraulic Systems & Instruments *Spring, 1948*

Aircraft Engine Maintenance and Service *Preparing*

Aircraft Maintenance and Service *Preparing*

These texts provide all the instruction in theory, materials, tools and techniques needed to meet the CAA mechanics' license requirements. Very clearly and simply written, fully illustrated, up-to-date, and completely in line with actual practice and professional requirements, they are excellent for vocational or technical courses. Step-by-step directions for shop projects in the construction of all aircraft parts according to standard specifications and in all approved repairs are included. The author is a teacher of wide experience and an official of the CAA.

THE BLUEPRINT LANGUAGE

By H. C. Spencer & H. E. Grant

Thoroughly explains every detail of blueprints, with especially good training in *visualization* through clear explanations of all views and methods of shape description used in technical drawings accompanied by expertly devised exercises in pictorial sketching. All illustrations and problem materials are reproductions of actual drawings and blueprints from the files of over 100 leading industrial concerns. 255 pp., 9½ x 11½, ring binding, $5.00.

ILLUSTRATED JIG-TOOLING DICTIONARY

By T. G. Thompson & R. A. Peterson

Working drawings, accompanied by concise definitions, of about 1000 tooling terms and procedures, including many of the special terms used in aircraft, marine and other individual industries, and giving special attention to the latest precision equipment. All of the basic equipment of the tool engineer and the uses of that equipment is thus graphically demonstrated. A highly useful reference for student and teacher alike. 349 pp., $7.50.

PLASTIC CRAFT

B. E. S. DeWick & J. H. Cooper

This complete, class-tested guide to shop and handicraft work in a highly rewarding medium provides scores of projects for all types of shop and for all degrees of skill. No expensive equipment is required. Full, clear directions for all work are illustrated with detailed working drawings. Many new and original designs are suggested, including fine-arts as well as shop work. 184 pp., 8¼ x 11½, $5.00.

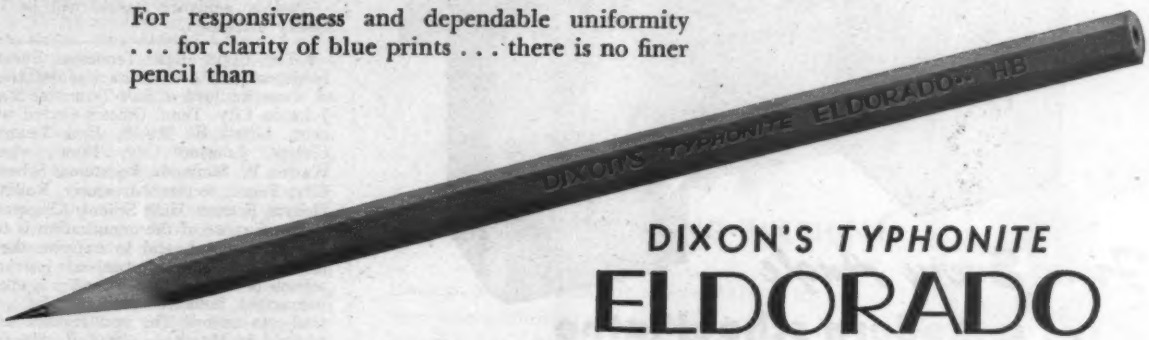
Copies to examine for use as class texts will be sent on request.

ELDORADO—Dean of Drawing Pencils

The first in the 1948 series of the Eldorado Problem and Solution Service is being prepared and will appear shortly. From coast to coast, the problems offered in this service have become standard classroom projects, and have earned the commendation of thousands of mechanical drawing teachers.

And these same teachers are just as firmly loyal to TYPHONITE ELDORADO . . . the pencil which makes this service possible.

For responsiveness and dependable uniformity . . . for clarity of blue prints . . . there is no finer pencil than



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Association News

A.V.A. CONVENTION

The American Vocational Association convention will be held at Los Angeles on December 15 to 18, 1947.

This convention will be a memorable one, and all those interested in industrial arts and vocational education should plan to attend. Those who attended the convention in this city in 1927 will remember how well Los Angeles took care of the convention at that time. This year will be even better, because the A.V.A., as well as the city have obtained much more experience in the skills that make conventions successful.

Not to be forgotten is the invitation issued by Dr. J. Harold Williams, acting provost of the University of California, Santa Barbara College, to all delegates and visitors to the convention to set aside Friday, December 19, as Santa Barbara Day and participate in a planned program which will include open house in the department of industrial education and the visiting of other points of interest in Santa Barbara.

Industrial Arts Section

Co-program chairmen for this section are George B. Cox, director of industrial arts, Oregon State College, Corvallis, Ore., and Emanuel E. Ericson, chairman, department of industrial education, University of California, Santa Barbara College, Santa Barbara, Calif.

The morning session on Tuesday, December 16, will discuss "The Functions of Industrial Arts Education." The chairman will be Frank C. Moore, A.V.A. vice-president for industrial-arts, and director of industrial arts, Cleveland, Ohio.

The subjects discussed will be "Functioning for Guidance," "Functioning for Production and Consumption," and "Functioning for Recreation."

A.V.A. convention committee meets with L. H. Dennis, executive secretary

The speakers assigned to these divisions of the subject are Stanley Pawelek, W. E. Warner, and Lynne Monroe. Clifford K. Lush will be the discussion leader at this session.

The meeting in the afternoon will be under the chairmanship of George B. Cox. The theme for the meeting will be "The Development of the Industrial Program."

Dewey Barich, Thomas M. Riley, and John R. Ludington will be the speakers who will discuss the subject from the viewpoint of the elementary school, the junior high, and the smaller high school. G. Harold Silvius will be the discussion leader.

Wednesday morning will be devoted to sightseeing trips through schools and industries.

The Wednesday afternoon session will be devoted to "Demonstrations of Teaching Techniques," under the chairmanship of Claude E. Nihart, head supervisor, vocational and practical arts, Los Angeles, Calif.

The demonstrations will embrace: New Techniques in Using Plastics, Versatility of the Silk Screen Process, The Electric Shop and Electronics, Graphic Presentations, Designs and Processes With Metals, and Small Wood Projects.

The demonstrators will be J. Lymann Goldsmith, Wayne A. Wonacott, Walter B. Ford, Fred Baer, Patrick J. Quinn, Carl W. Wirths, and Dan Mullock.

On Thursday morning the topic of "Selecting and Preparing Industrial-Arts Teachers" will be discussed under the chairmanship of Emanuel E. Ericson.

"The Selection of Candidates," "Basic Preparation," "In-Service Development," and "Graduate Study," will be discussed by Kenneth Gordon G. Wilson, Clifford K. Kronenthal, and Arthur B. Mays.

DeWitt Hunt will be the discussion leader.

National Association of State Trade and Industrial Supervisors

The chairman of the Sunday evening session will be W. A. Seeley, president of the association.

The speakers at this meeting will be R. W. Gregory, Walter H. Cooper, and L. H. Dennis. Herman N. Miller will be the discussion leader.

The Monday morning session will be a joint meeting of the National Association of State Supervisors of Trade and Industrial Education and the National Association of Industrial Teacher Trainers. Chairman of the meeting will be W. A. Seeley.

Reports of the joint committees on:

Analysis of functions performed in operating local industrial education program will be given by S. Lewis Land; Development of instructional material by Arthur S. Wrigley; Defining the scope of trade competency examinations by Paul Lofgren. Walter H. Cooper will also address the meeting.

At the Monday afternoon session the speakers will be Arthur S. Wrigley, Edward M. Claude, and O. H. Beaty.

The business meeting of this association will follow immediately at the end of the discussion.

The National Association of Industrial Teacher

(Continued on next page)

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(Continued from previous page)

Trainers will have meetings Sunday evening, Monday morning, and Monday afternoon.

A supervisory training session will be held Tuesday morning.

The chairmen of the general session of the industrial education division, held on Tuesday afternoon, will be Philip L. McNamee, assistant superintendent of schools, board of education, Chicago, Ill.

The theme for this session is "Industrial Education for the Air Age."

The theme for the graphic arts education section on Tuesday morning will be "Educational Preparation for Printing Vocations." The chairman will be Allison Manners, Frank Wiggins Trade School, Los Angeles, Calif.

Another meeting of this section will be held Thursday morning.

The general session for the industrial education division will be held Wednesday afternoon on "Inter-American Industrial Education," under the chairmanship of J. Graham Sullivan, director of adult and vocational education, San Diego, Calif.

The safety and industrial education section will have its meeting on Thursday morning. Wayne B. Hughes, director, school and college division, National Safety Council, Chicago, Ill., will be the chairman, and A. C. Blackman, Lester E. Ecke, DeWitt Hunt, and Roy R. Van Duzee will be the speakers.

Apprenticeship education will be discussed by a panel at a meeting on Thursday morning.

Ronald Kent, director, Essex County Vocational School, Newark, N. J., will be the chairman. The panel will include William F. Patterson, Archie J. Mooney, E. C. Hinckley, J. F. Ingram, John H. Hill, J. H. Stephenson, Lloyd A Mashburn, and Irvin De Shetler.

Vocational Guidance

The Tuesday morning guidance session will be under the chairmanship of Dolph Camp, state supervisor, Occupational Information and Guidance, State Department of Education, Little Rock, Ark.

H. B. McDaniel will give a talk on "The Training of the Vocational Counselor," and Royce E. Brewster, William H. McCreary, Harry Smallenburg, Truman Cheney, C. L. Greiber, J. Graham Sullivan, and Florence E. Murphy will be the members of the panel.

C. L. Greiber will be the chairman of the Tuesday afternoon session.

"The Role of the Vocational Counselor in Education for the Years Ahead" will be discussed by Dana M. Cotton, and "The Status of State Guidance Programs under the Provisions of the George-Barden Act," will be presented by Glenn E. Smith.

A panel discussion will follow.

Another guidance session will be held Wednesday afternoon.

♦ The Upper East Tennessee Vocational and Industrial Arts Association was organized recently at a meeting held at East Tennessee State College, Johnson City, Tenn. Officers elected were: president, Alfred H. Moore, East Tennessee, State College, Johnson City, Tenn.; vice-president, Warren W. Simmons, Vocational School, Johnson City, Tenn.; secretary-treasurer, Rollin Kennerly, Dobyns-Bennett High School, Kingsport, Tenn.

The purpose of the organization is to stimulate the development, and to improve the standards, of vocational and industrial-arts instruction in the schools of this area. Membership is open to active instructors, industrial workers, and senior industrial-arts majors. The next regular meeting is to be held in March. — *Alfred H. Moore.*

♦ The annual meeting of the Indiana Directors of Vocational Education was held at Purdue University on August 14 and 15. Seventy-two persons representing directors, co-ordinators, and administrative officers attended the various sessions. The program was opened on Thursday morning by Joe Strobel, director of vocational education for the state of Ohio, who gave a very fine analysis of problems and opportunities presented by the passage of the George Barden Act.

At the suggestion of a number of directors in the state, Professor M. F. Stigers conducted a conference at which time members of the conference presented problems for further study. These are to be further considered at the next meeting of the directors. Harry S. Belman gave a very illuminating analysis of our relationship to veteran's training. This paper was based on his experiences in the veterans' work in the state of Wisconsin, before coming to Indiana.

At the banquet session Thursday evening, Supt. Ben Watt presented a very inspiring talk on "Opportunities in the Field of Industrial Education."

On Friday afternoon, Dr. Paul Bergiven, chairman of the Local Council of Administrators, presided at a business meeting at which time he was presented the charter for the Indiana Council by Earl Bedell, director of vocational education in Detroit. Mr. Bedell pointed out that this is the first charter to be presented to any state in the United States.

The directors voted to return to Purdue on the date of November 14 and 15 for a fall meeting.

♦ The annual meeting of the Michigan Vocational Association was held at Clear Lake Camp of Western Michigan College of Education, with the theme "Understanding Your Association."

The following officers were elected: president, L. R. Stanley, Benton Harbor; vice-president, Milton Ellison, Battle Creek. A paid secretary-treasurer was to be appointed later.

♦ The officers elected by the Michigan Industrial Education Association for the present school year are: president, Claud Bosworth, director of industrial education, Muskegon; vice-president, Joel W. Lee, supervisor of industrial education, Owosso; executive secretary-treasurer, Arthur L. Reagh, Grand Rapids.

(Continued on next page)

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♦ At the Massachusetts Vocational Association convention in May, a Quarter Century Club was formed. Herbert W. Moore, New Bedford, Mass., past president of M.V.A., was the organizer. Robert O. Small, dean of vocational education in Massachusetts, was elected president of the club.

The following were elected as officers of the Massachusetts Vocational Association for the coming year. Lewis B. Robinson, Lawrence High School, Falmouth, president; Herbert P. Schmidt, Holyoke Trade School, vice-president; Kathleen G. Delaney, Lowell Girls Vocational School, secretary; Paul J. Sullivan, Worcester Boys' Trade School, treasurer.

♦ The Agricultural Teachers' Association of New Jersey elected the following as officers for the coming year: president, Warren Gredetzke, Glassboro, N. J.; secretary, Gail Whitson, Jamesburg, N. J.; treasurer, Herbert Wright, New Brunswick, N. J.

♦ The North Dakota Vocational Agricultural Association, at its meeting at Fargo, N. Dak., July 21–25, elected the following officers for the coming year: president, Lloyd Nygard, Velva, N. Dak.; vice-president, Bruce Ellingson, Maddock, N. Dak.; and secretary-treasurer, S. D. Owen.

♦ The Tennessee Vocational Association, at its annual meeting in Nashville, elected the following officers for 1947–48: president, W. C. Yates, Franklin, Tenn.; vice-president, Agriculture, W. E. Robertson, Knoxville; vice-president, Distributive, Mrs. Ruth Clark, Nashville; vice-president, Homemaking, Mrs. Theresa L. Anderson, Dresden; vice-president, Trade and Industrial Education, Roger Lusk, Knoxville; vice-president, Industrial Arts, Raymond McElroy, Memphis; secretary-treasurer, W. A. Seeley, Nashville; adviser, G. E. Freeman, state director of vocational education, Nashville.

♦ Officers for the coming year elected by the South Carolina Vocational Association are: president, Evelyne McCollum, Columbia, S. C.; vice-president, Frank L. Barton, Woodruf, S. C.; secretary, J. V. Kneece, Newberry, S. C.; treasurer, Ann Morgan, Greenville, S. C.; editor, James McClary, Columbia, S. C.

♦ The first annual, all-state, convention of the Minnesota Vocational Association was held at Radisson Hotel, Minneapolis, Minn., October 2 and 3, 1947.

Close to 1100 teachers, co-ordinators, directors, superintendents, principals, and board of education members attended.

The first general meeting was held Thursday morning, October 2, at 10:00 a.m.

John A. Butler, president, Minnesota Vocational Association, was the chairman.

After Willard E. Goslin, superintendent, Minneapolis Public Schools, welcomed the members of the Minnesota Vocational Association to Minneapolis, Dean M. Schweickhard, state commissioner of education, spoke on "Educational Philosophy for Minnesota."

The subject, "What Your Minnesota Association Can Mean to You," was then presented by Miss Florence Fallgatter, president, American Vocational Association.

The noon hour was given over to departmental luncheons and the afternoon to departmental conferences.

At 6:00 p.m. the banquet was held under the chairmanship of John A. Butler.

Dr. C. A. Prosser, nationally known vocational educator, presented "My Analysis of Educational Functions." He was followed by Thomas H. Quigley, head, industrial education department, and director, Extension School, Georgia School of Technology, Atlanta, Ga., who spoke on the subject, "Training Youth to Function Properly as Self Sustaining Social and Economic Members in the American Way of Life."

The Friday morning sessions opened with a general breakfast at which Harry C. Schmid, state director of vocational education, presided. The speakers on this occasion were Walter Rogosheske, representative, 45th District of Minnesota,

(Continued on next page)

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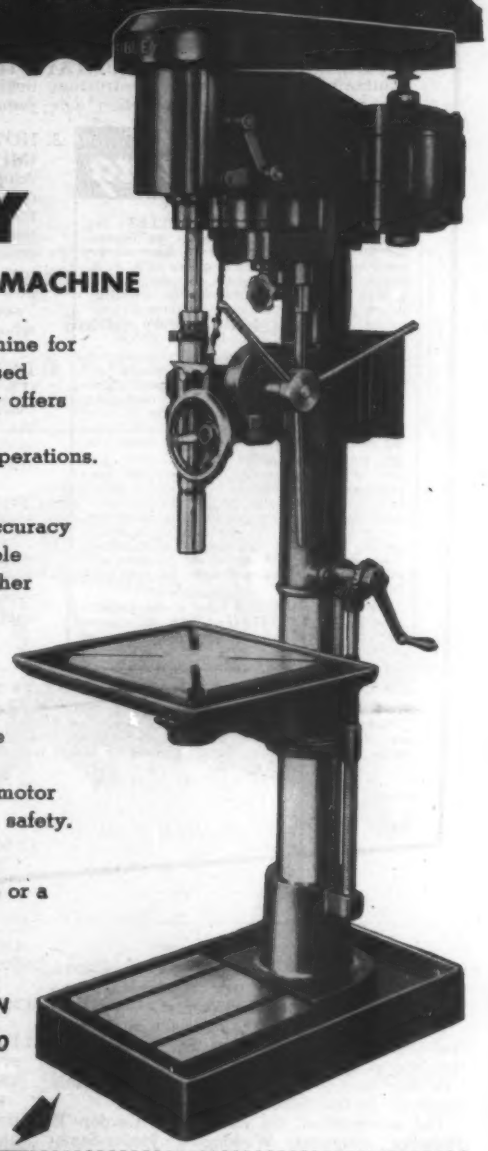

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2. MASONRY SIMPLIFIED, Vol. II—Practical Construction. As complete in its coverage as it is thorough in its explanations. *Publication date January 5, 1948.*
3. FUNDAMENTALS OF CARPENTRY, Vol. I—Tools, Materials, Practice. *Durbahn.* This newcomer to our popular building trades series presents the fundamentals in "teachable" form for the beginner and the apprentice. Price, $3.25
4. FUNDAMENTALS OF CARPENTRY, Vol. II—Practical Construction. Authoritative, well tested construction methods clearly explained and elaborately illustrated. *Publication date January 5, 1948.*

Tech Training

CONVENING IN LOS ANGELES the American Vocational Association on December 15–18 will present one of the most interesting and challenging programs in A. V. A. history. You cannot afford to miss it. The various sections have assured an unusually strong program, and the entertainment committee has taken advantage of the wealth of talent in this "entertainment capital."

KEEPING PACE with the educational features of the program, the commercial exhibitors will present one of the most elaborate displays ever sponsored by their own organization, The Ship. Quantities of new equipment, new publications, and new training aids will be available for your inspection.

BY FAR THE MOST IMPORTANT feature of the convention will be *your* participation. A convention is not just a collection of exhibits, speakers, and entertainers — those are merely the *means* of drawing people together for the purpose of mutually solving their individual and group problems. *Your attendance is one of the greatest contributions that you can make to your profession.*

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(Continued from previous page)

and Dr. C. A. Prosser, who spoke on the subjects, "Educational Legislation for Minnesota," and "Prosser Resolution," respectively.

Harry C. Schmid was the chairman at the general session Friday afternoon. The panel discussion held at this time concerned itself with "What Can Be Done to Improve Vocational Guidance Programs in Our Schools?"

The members of the panel were Gordon E. Miniclier, counselor, Washington Junior-Senior High School, St. Paul; Ralph T. Craigo, assistant director, Dunwoody Industrial Institute, Minneapolis; Wylie B. McNeal, chief, home-economics division, University of Minnesota; Leslie J. Gustafson, superintendent, Owatonna Public Schools; and George R. Richter, manager, Richter Personnel Service, St. Paul.

At the conclusion of the panel discussion Thomas H. Quigley spoke on "Co-ordinating General and Vocational Education for Effective Training."

The "Ship" program with its entertainment and prizes then followed.

The departmental meetings on Thursday and Friday covered vocational agriculture, business education, home education, industrial arts, trade and industrial education, and administration.

♦ At the meeting of the Northwestern Wisconsin Teachers Association held at Eau Claire, Wis., on October 10, George Soderberg was elected chairman of the industrial-arts section. He also presented a color film on "Audio-Visual Guidance in Color Dynamics."

C. Rich talked on "The Slide Rule Simplified."

♦ About 400 Wisconsin vocational-agriculture instructors met at the College of Agriculture at Madison, June 9–13.

The Wisconsin Association of Vocational Agriculture Instructors, which met at the same time, elected the following as officers for the coming year: president, D. A. Hendrickson, Barron, Wis.; vice-president, M. F. Ross, Fort Atkinson; secretary-treasurer, M. S. Murray, Cameron; Directors representing instructors of veterans: William Doyle, Bruce; Leonard Warner, Appleton; Parmley Harris, Mineral Point; directors representing regular instructors: Howard Askov, Osceola; Vernon Horne, Stanley; H. T. Shields, Prairie du Sac.

♦ The annual meeting of the New York State Vocational and Practical Arts Association will be held in Buffalo at the Hotel Statler during the Easter vacation of 1948.

♦ Officers of the Pennsylvania Vocational Association are: president, Joseph W. Fleming, director of vocational education, Pittsburgh; secretary-treasurer, Henry S. Brunner, head of the department of agricultural education, The Pennsylvania State College, State College, Pa.

News Notes

♦ The National Board of Fire Underwriters, 85 John Street, New York 7, N. Y., has issued a booklet entitled "Stop Fires," which outlines the common fire hazards and tells how to eliminate them. It also cautions that panic prevention and first aid are necessary in reducing the terrific losses in lives and in property which we have each year.

Copies of the booklet may be obtained free by writing for them.

♦ Television broadcasts of a series of high school football games are being sponsored for the first time in television history, as the Pontiac dealers of Philadelphia present three games played by Dobbins Vocational-Technical school at Shibe Park, Philadelphia, Pa., over Philco television station WPTZ.

♦ Ten directors of vocational education in Brazil are enrolled in the department of industrial education at the Pennsylvania State College in an intensive three months' training program. The Brazilian directors began their program of training on September 22. They will complete eight courses offered on an intensive basis: Philosophy of Vocational Education, Trade Analysis, Curriculum Construction, Shop Organization and Management, Methods of Teaching Industrial Subjects, Administration of Vocational Education, Supervision of Vocational Education and Survey Methods. The program will be completed on December 12. The entire group of Brazilian directors will attend the annual convention of the American Vocational Association in Los Angeles.

A second group of 14 directors of vocational education in Brazil will receive the same intensive program of training beginning on January 19 and concluding on April 16.

The program is under the auspices of the Institute of Inter-American Affairs, an agency of the Department of State.

New Publications

Workbook in Mechanical Drawing: An Introductory Course

By S. L. Coover. Paper, 201 pp., 8½ by 11 in., illus., $1.48. The McGraw-Hill Book Co., New York, N. Y.

This workbook is for beginners in mechanical drawing. The work is designed to meet the needs and interests of junior high school students.

The material is covered in 10 units which take up the subject matter under the following headings: blueprint reading, the projection box,

(Continued on page 26A)

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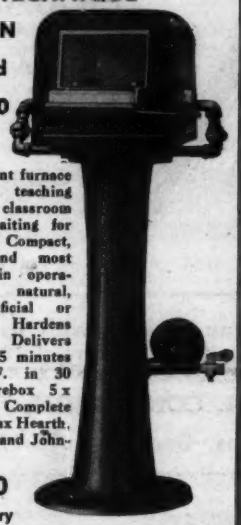

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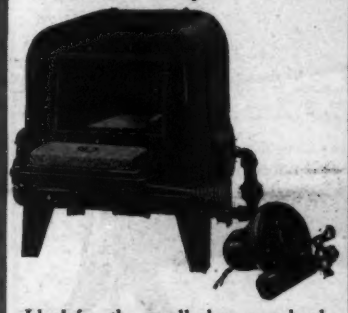

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(Continued from page 24A)

sketching, home planning, practical drawing problems, dimensioning, special shop projects, fasteners, and charts and graphs.

The author suggests that the student may be permitted to either sketch or draw the problems presented in the book. He contends that blueprint reading may be taught merely through sketching.

Adventures With Plastics

By Louis V. Newkirk, Coleman Hewitt, and LaVada Zutter. Cloth, 275 pp., 7⅜ by 10⅛ in., illus., $3.50. D. C. Heath & Co., Boston, Mass.

This book presents detailed working drawings for numerous projects which will delight the student in the school shop and the homecrafter working in his own workshop at home. The method of making the various objects is clearly stated in readily understood, step-by-step directions.

There are 11 chapters in the book which present the subject under the following headings: tools and processes; costume jewelry; articles for the desk, table, and the home; dress accessories; recreation; fixtures, preserving specimens; types of plastics; and plastics in modern industry.

The appendix gives directions for ordering plastics and supplies.

Elements of Radio Servicing

By William Marcus and Alex Levy. Cloth, 475 pp., 6⅜ by 9⅛ in., illus., $3.60. McGraw-Hill Book Co., New York, N. Y.

A textbook on the elementary practices and principles of radio servicing for vocational school students.

In its chapters are discussed superheterodyne receivers; the servicing procedures; the various power, amplifier, mixer, and oscillator stages; loud-speakers and antennas, and the like.

Teaching the Industrial Arts

By Emanuel E. Ericson. Cloth, 384 pp., 6¼ by 8⅝ in., illus., $4. The Manual Arts Press, Peoria, Ill.

A revised and reset edition which helps the industrial-arts teacher to get a better view of his duties as an instructor of the young.

It tells him what methods and procedures he should use in his work, how to handle disciplinary problems, how to organize and manage his shop classes, how to use teaching aids, how to insure accident prevention, what related and guidance information he should use, how to test his pupils and record their progress, how to evaluate his own teaching efficiency, how to prepare a course of study, plan a school shop, prepare publicity material, and take care of his professional advancement.

Conference Guide to Basic Management Training

By Arthur S. Hotchkiss. Cloth, 196 pp., 8 by 10¼ in., illus., $5.50. National Foremen's Institute, Inc., Deep River, Conn.

The author, out of his years of experience, presents to the conference leader suggestive outlines for ten conferences which will give direction and content to the supervisors' training work in his plant.

In these conferences the following subjects are discussed: Development of responsibilities, relationships of the supervisor and the union, company labor policies, prevention and adjustment of grievances, handling job relations problems, interviewing, and discipline.

Teaching Aeronautics in High Schools

By Ralph Haefner and others. Cloth, 194 pp., 5½ by 8½ in., illus., $3.50. McGraw-Hill Book Co. Inc., New York, N. Y.

A study of practices and methods used by experienced teachers showing how they teach aeronautics to high school students in their own classes.

This study, made for the Civil Aeronautics Administration and the American Council on Education, shows also how these teachers made effective use of visual aids of various kinds.

The subjects cover aerodynamics, meteorology, navigation, and power plants.

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Shop Equipment News

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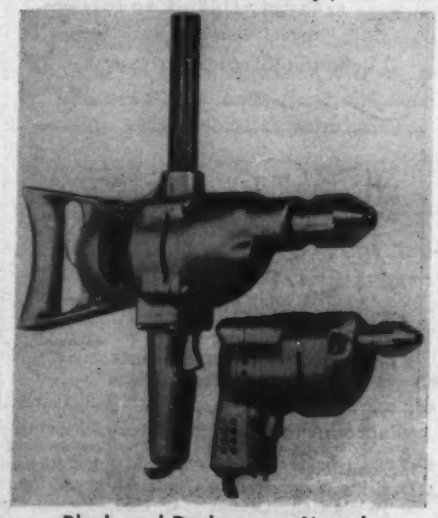

Black and Decker new ¼ and ½-in. drills

These "Home Utility" drills are available in ¼-in. and ½-in. sizes. Both of these drills are powered by universal motors which use either alternating or direct current. They have strong, light, die-cast aluminum housings; sturdy gears, pinions and bearings; instant-release trigger switch; fast-operating Jacobs chucks; and three-wire electric cord for ground connection. The ¼-in. drill is compact and close-coupled for close-corner work, with a comfortable, hand-fitting shape. The ½-in. drill has a spade end handle and removable pipe handle.

Bench stands for each model are available. They convert the drills into convenient drill presses for smoother operation on more delicate work; for leverage that means extra power in tough drilling; for drilling to a predetermined depth; for correct spacing of multiple holes in a strip or plate; while freeing one hand to guide work and lubricate drilling. Each drill fits into its stand in a few seconds and is removed just as quickly.

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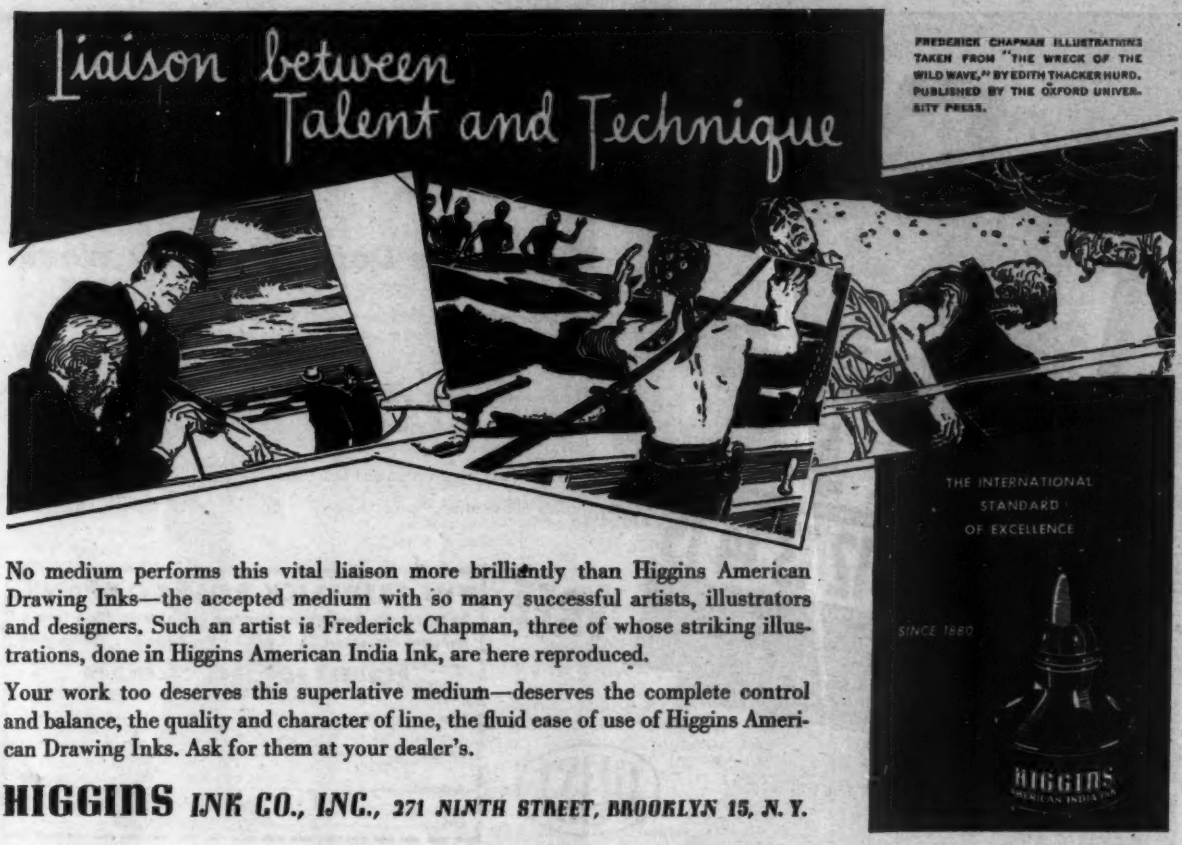
A new electric contouring device for duplicating work accurately, automatically, and quickly, and which can be installed on any LeBlond Regal lathe in a matter of minutes, has been announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

(Continued on next page)

Electric contouring device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(Continued from previous page)

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Constant distance between tool and template is maintained because the template bar is a part of the tool slide and moves in and out with it. The diameter is thus controlled by the regular cross-feed screw.

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For complete details, send for Bulletin EC-1.

For brief reference use IAVE—1202.

NEW MODEL C-20 SIBLEY DRILLING MACHINE

A new high speed drilling and tapping machine has been announced by the Sibley Machine & Foundry Corp., South Bend, Ind.

This 20-in. swing Sibley is an all-purpose machine. It is designed for sensitive drilling and tapping operations at high speed, and its 2 h.p. motor furnishes ample power to drill 1½-in. holes in mild steel.

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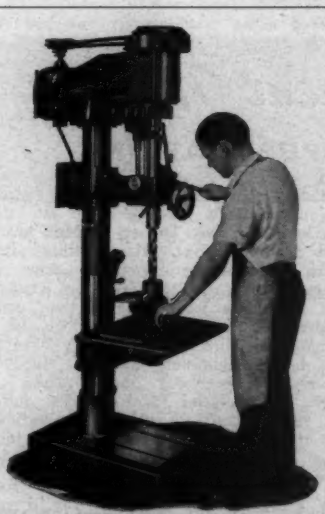
The new catalog No. 67, which explains all features of this machine, may be had by writing



C-20 Sibley Drilling Machine

Sibley Machine & Foundry Corp., South Bend, Ind., mentioning this magazine.

For brief reference use IAVE—1203.

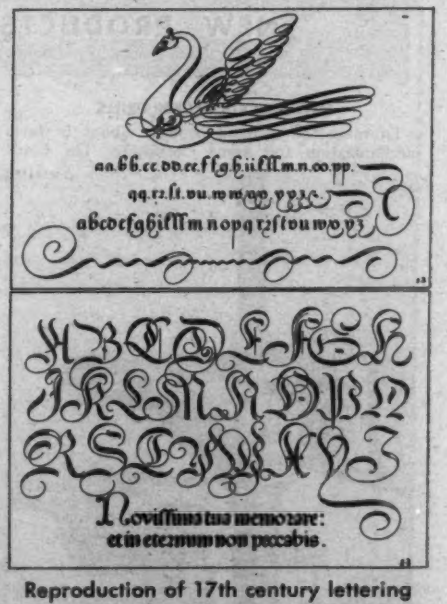
NEW LITERATURE ANNOUNCEMENT

All pliers, adjustable wrenches, and pipe wrenches now offered by the Plomb Tool Company, 2209B Santa Fe Ave., Los Angeles 54, Calif., are described and illustrated in a new bulletin — No. 4728. These tools, manufactured in Plomb's recently acquired Jamestown, N. Y., plant of the J. P. Danielson Company, include 24 pliers, 12 adjustable wrenches, and 6 pipe wrenches.

For brief reference use IAVE—1204.

OLD LETTERING CHARTS

The C. Howard Hunt Pen Co., Camden, N. J., manufacturers of lettering, artist's, and Speedball pens, are making available reproductions of charts taken from a book of 17th Century Letter-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Novissima hæc memoriæ:
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ing and Fine Writing. This book by Richard Daniel, was presented to Charles II, at the Court at White-Hall, October 24, 1663. Present-day ornamental testimonials, diplomas, and engrossed

(Continued on page 34A)

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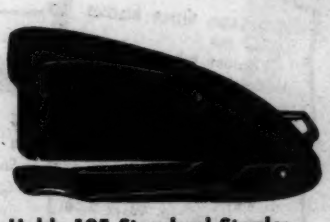

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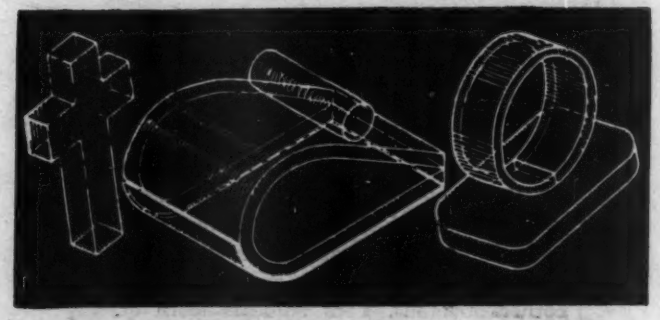

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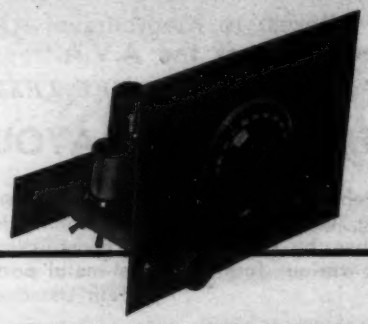

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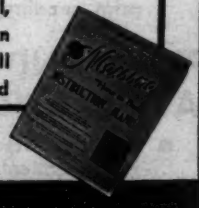

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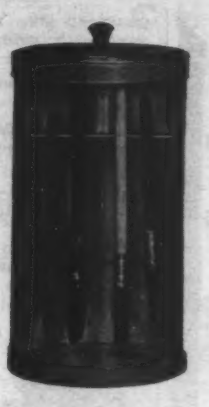

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(Continued from page 28A)

documents differ very little from these interesting seventeenth century examples. Six of these charts are now available.

For brief reference use IAVE—1205.

NEW SHELDON LATHE

The Sheldon TRB S-56 lathe is a new product specially designed for schoolshop work.

It has a 11¼-in. swing, 1-in. collet capacity, and a 56-in. bed. It is driven by a 1 h.p. motor, and has two V belts to the spindle. All belts, gears, and pulleys are enclosed.

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For brief reference use IAVE—1206.

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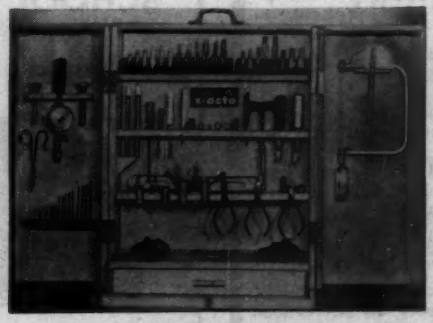

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For brief reference use IAVE—1207.

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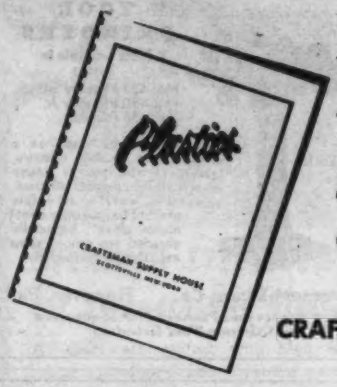

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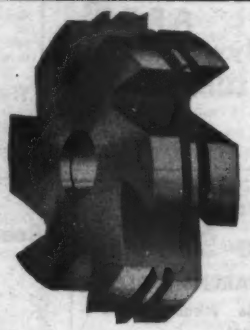

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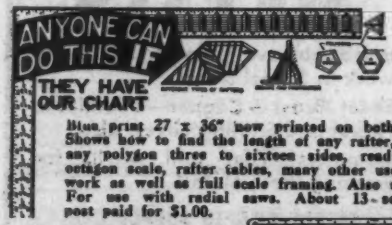

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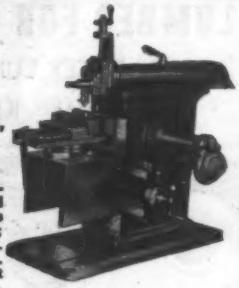

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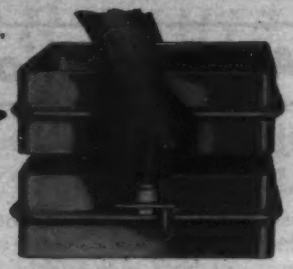

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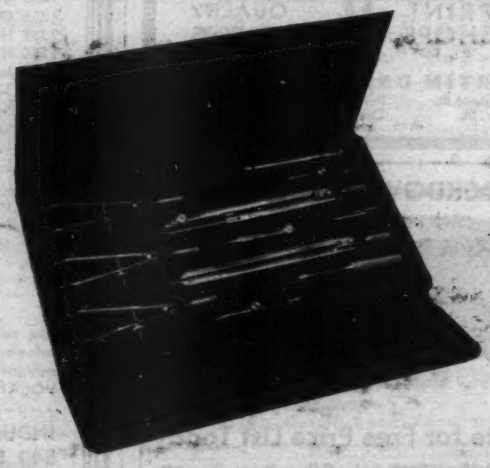

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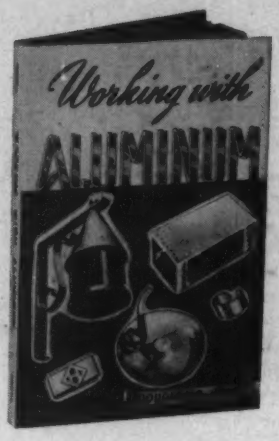

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